

# CONTRACTORS' & ENGINEERS' MONTHLY

A Purchasing Guide for Engineers, Contractors, Public  
Officials and Other Buyers of Construction Equipment.

## THE JACK FOR ALL TRADES

*Never Turns Around—Never Backs Down*



### The Doughboy Jack

—the lightest jack made for its capacity. Weighs considerably less than other jacks of equal power, in some sizes less than half as much.

**Sizes for 15 to 100 tons**

Easy to operate; a 24-inch handle provides ample leverage. Has a positive check to prevent damage from over-extension. Made of steel throughout.

*Bulletin 30 tells all about the Doughboy Jack.*

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Rock Drills — Pile Hammers — Lifting Jacks — Mining and Quarrying Machinery

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# Where to Purchase

A comprehensive Directory of the leading machinery and supply manufacturers arranged for the convenience of contractors, engineers, water-works superintendents, municipal and county engineering departments, street and highway officials, city managers, etc., and public officials who may desire to secure catalogs or prices on construction equipment. Where the name of a manufacturer is preceded by a star (\*) it indicates that the user of the directory may secure further information by referring to the manufacturer's advertisement in this issue. The index to advertisers will be found on page facing the inside back cover.

## ACETYLENE

Prent-O-Lite Co., Inc., New York.

## ACETYLENE APPARATUS

Air Reduction Sales Co., New York.  
Oswald Acetylene Co., Newark, N. J.

## ADDING MACHINES. (See Calculating Machines.)

## AIR COMPRESSORS

Allis-Chalmers Mfg. Co., Milwaukee, Wis.  
Chicago Pneumatic Tool Co., New York.  
De Laval Steam Turbine Co., Trenton, N. J.  
De La Vergne Machine Co., New York.  
Fairbanks, Morse & Co., Chicago, Ill.  
Gardner Governor Co., Quincy, Ill.  
General Electric Co., Schenectady, N. Y.  
Hardie-Tynes Mfg. Co., Birmingham, Ala.  
Ingersoll-Rand Co., New York.  
Nordberg Mfg. Co., Milwaukee, Wis.  
Norwalk Iron Works Co., South Norwalk, Conn.  
Schramm, Inc., West Chester, Pa.  
Stratton & Bragg Co., Petersburg, Va.  
Sullivan Mch. Co., Chicago, Ill.  
United Iron Works, Kansas City, Mo.  
Westinghouse Trac. Brake Co., Wilmerding, Pa.  
Worthington Pump & Mch. Corp., New York.

## ARC LAMPS

General Electric Co., Schenectady, N. Y.  
Westinghouse Elec. & Mfg. Co., E. Pittsburgh, Pa.

## ARCHITECTURAL IRON WORK

Chesapeake Iron Works, Baltimore, Md.  
Dietrich Bros., Baltimore, Md.  
Hirsch Rolling Mill Co., St. Louis, Mo.  
Sneed Arch. Iron Works, Louisville, Ky.

## ARTESIAN WELL DRILLS AND PUMPS

Am. Well Works, Aurora, Ill.

## ASBESTOS PRODUCTS

\*Carey Co., Philip, Cincinnati, Ohio.  
Dominion Asbestos & Rubber Corp., New York.  
Kearbey & Mattison Co., Ambler, Pa.  
Mikeas Bros. Co., Chicago, Ill.  
Norristown Magnesia & Asbestos Co., Norristown, Pa.  
Roll Mountain Co., Chicago, Ill.

## ASH HANDLING MACHINERY

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Bartlett & Snow Co., C. O., Cleveland O.  
Bay City Dredge Wks., Bay City, Mich.  
Brown Hoisting Mach. Co., Cleveland, Ohio.  
Byers Mach. Co., Ravenna, Ohio.  
Chain Belt Co., Milwaukee, Wis.  
Gifford-Wood Co., Hudson, N. Y.  
Green Eng. Co., East Chicago, Ind.  
Guarantee Constr. Co., New York.  
International Motor Co., New York.  
Jeffrey Mfg. Co., Columbus, Ohio.  
Kilbourne & Jacobs Mfg. Co., Columbus, O.  
Lakewood Eng. Co., Cleveland, O.  
Link-Belt Co., Chicago, Ill.  
Mead-Morrison Mfg. Co., E. Boston, Mass.  
Portable Machinery Co., Passaic, N. J.  
Robins Conv. Belt Co., New York.  
Webster Mfg. Co., Chicago, Ill.  
Weller Mfg. Co., Chicago, Ill.

## ASPHALT PRODUCERS

\*Barber Asphalt Co., Philadelphia, Pa.  
\*Pioneer Asphalt Co., Lawrenceville, Ill.  
\*Standard Oil Co. (Indiana), Chicago, Ill.  
\*Texas Co., New York.  
\*Warren Bros. Co., Boston, Mass.  
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Barrett Co., New York.  
Gulf Refining Co., Pittsburgh, Pa.  
Headley Good Roads Co., Philadelphia, Pa.  
Ky. Rock Asphalt Co., Louisville, Ky.  
New Orleans Refining Co., New Orleans, La.  
Sinclair Ref. Co., Chicago, Ill.  
Standard Oil Co. of Calif., San Francisco, Cal.  
Standard Oil Co. of La., New Orleans, La.  
Standard Oil Co. of N. J., Newark, N. J.  
Standard Oil Co. of N. Y., New York.  
U. S. Asphalt Refining Co., New York.

## ASPHALT BLOCK

Hastings Pavement Co., New York.

## ASPHALT CUTTERS

Dayton Pneumatic Tool Co., Dayton, Ohio.  
Chicago Pneumatic Tool Co., New York.  
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Electric Welding Co., Pittsburgh, Pa.  
Hinman & Co., D. A., Sandwich, Ill.  
McKenna Co., Cleveland, Ohio.  
Ransome Concrete Mch. Co., Dunellen, N. J.

## BAR CHAIRS, REINFORCING

\*Truscon Steel Co., Youngstown, Ohio.  
Concrete Steel Co., New York.  
Universal Form Clamp Co., Chicago, Ill.


\*Indicates that the manufacturer carries an advertisement. See index facing inside back cover.

# ANNOUNCING

**PATTEN  
HOISTS**

**STREET  
HOISTS**

# CONSOLIDATION



# STREET HOISTS

The Street Bros. Machine Wks. and the Patten Mfg. Co.  
having consolidated November 1, 1922  
**"STREET HOISTS" and "PATTEN HOISTS"**  
 will henceforth be manufactured and sold by  
**STREET BROTHERS MACHINE WORKS INC.**  
 Chattanooga, Tennessee, U. S. A.

If it's to lift, drag or pull we manufacture it.  
**YOUR INQUIRIES WILL BE APPRECIATED**  
**HOISTS—DERRICKS—DERRICK CARS—CABLEWAYS, etc.**

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Carbon Steel Co., Pittsburgh, Pa.  
Carnegie Steel Co., Pittsburgh, Pa.  
Franklin Steel Works, Franklin, Pa.  
Gulf States Steel Co., Birmingham, Ala.  
Hirsch Rolling Mill Co., St. Louis, Mo.  
Illinois Steel Co., Chicago, Ill.  
Inland Steel Co., Chicago, Ill.  
Lackawanna Steel Co., Buffalo, N. Y.  
Midvale Steel & Ordnance Co., Philadelphia, Pa.  
Republic Iron & Steel Co., Youngstown, O.  
St. Louis Screw Co., St. Louis, Mo.  
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Tennessee Coal, Iron & R. R. Co., Birmingham, Ala.  
United Alloy Steel Corp., Canton, Ohio.

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Fairbanks Co., The, New York.  
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Goodyear Tire & Rubber Co., Akron, O.  
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Robins Conv. Belt Co., New York.  
Salsbury & Co., Inc., W. H., Chicago, Ill.  
Southern Rubber & Belt Co., Houston, Tex.  
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\*Austin-Western Rd. Mach. Co., Chicago, Ill.  
\*Good Roads Mach'y Co., Kennett Square, Pa.  
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Fairfield Engineering Co., Lancaster, Ohio.  
Gallon Iron Works & Mfg. Co., Gallon, Ohio.  
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Pittsburgh-Des Moines Steel Co., Pittsburgh, Pa.  
Ransome Concrete Machy. Co., Dunellen, N. J.  
Universal Road Machinery Co., Kingston, N. Y.  
Weller Mfg. Co., Chicago, Ill.

## BLAST HOLE DRILLING MACHINES. (See "Well Drilling and Blast Hole Machines")

## BLASTING POWDER (See Explosives)

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Heine Boiler Co., St. Louis, Mo.  
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Petroleum Iron Works Co., Sharon, Pa.  
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Valk & Murdoch Co., Charleston, S. C.  
Vogt Mch. Co., Inc., Louisville, Ky.  
Walsh & Weidner Boiler Co., Chattanooga, Tenn.

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American Screw Co., Providence, R. I.  
American Spike Co., New York.  
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Clark Bros. Bolt Co., Milldale, Conn.  
Erie Bolt & Nut Co., Erie, Pa.  
Foster Bolt & Nut Mfg. Co., Cleveland, Ohio.  
Inland Steel Co., Chicago, Ill.  
Lackawanna Steel Co., Buffalo, N. Y.  
Lanamon & Sessions Co., Cleveland, Ohio.  
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Oliver Iron & Steel Co., Pittsburgh, Pa.  
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Progressive Mfg. Co., Torrington, Conn.  
Republic Iron & Steel Co., Youngstown, O.  
Rhode Island Tool Co., Providence, R. I.  
Russell, Burdall & Ward Co., Fort Chester, N. Y.  
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Scranton Bolt & Nut Co., Scranton, Pa.  
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## BRACES, TRENCH

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Haydenville Co., Haydenville, Mass.  
Hays Mfg. Co., Erie, Pa.  
Mueller Mfg. Co., H., Decatur, Ill.  
United Brass Mfg. Co., Cleveland, O.

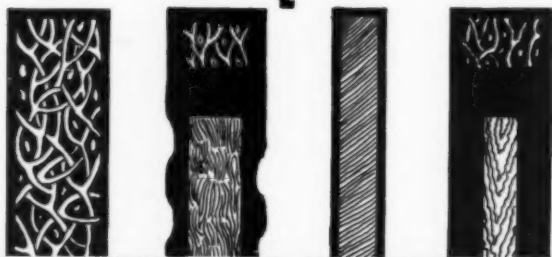
## BRICK, PAVING (See Paving Brick)

## BRIDGES AND BUILDINGS, STEEL

\*Frederick Snare Corporation, New York.  
American Bridge Co., New York.  
Bellevue Bridge & Steel Co., Bellevue, O.  
Belmont Iron Works, Philadelphia, Pa.  
Berlin Constr. Co., Berlin, Conn.  
Bethlehem Steel Bridge Corp., Bethlehem, Pa.  
Blaw-Knox Co., Pittsburgh, Pa.  
Boston Bridge Works, Boston, Mass.  
Central States Bridge Co., Indianapolis, Ind.  
Champion Bridge Co., Wilmington, O.  
Chesapeake Iron Works, Baltimore, Md.  
Chicago Bridge & Iron Works, Chicago, Ill.  
Clinton Bridge Wks., Clinton, Iowa.  
Eastern Bridge & Struc. Co., Worcester, Mass.  
Ferguson Co., H. K., Cleveland, O.  
Flour City Orn. Iron Co., Minneapolis, Minn.  
Fort Pitt Bridge Works, Pittsburgh, Pa.  
Hydraulic Steelcraft Co., Cleveland, O.  
Ingalls Iron Works Co., Birmingham, Ala.  
Inland Steel Co., Chicago, Ill.  
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King Bridge Co., Cleveland, O.  
Lackawanna Bridge Wks. Corp., Buffalo, N. Y.  
Lewis-Hall Iron Wks., Detroit, Mich.  
Louisville Bridge & Iron Co., Louisville, Ky.  
McClintic Marshall Co., Pittsburgh, Pa.  
Milwaukee Bridge Co., Milwaukee, Wis.  
Minn. Steel & Mch. Co., Minneapolis, Minn.

\* Indicates that the manufacturer carries an advertisement. See index facing inside back cover.

# Servicised Expansion Joints



## MONITORS OF THE ROAD

Old principles of expansion joint provide fillers of solid asphaltic content or impregnated fibre and asphalt in an elastic mass. ¶ The fundamental purpose of the filler is to re-occupy the space left by two contracting slabs. ¶ Solid asphaltic or impregnated fibrous materials contract, concrete slabs likewise contract on cooling. ¶ Three contracting bodies cannot occupy the same space as when expanded. Servicised joints expand when the concrete slabs contract. ¶ This is the key to a permanent waterproof joint; a correct answer to the problem of expansion between two contracting bodies. Unimpregnated cellular fibrous matter in Servicised Joints brings about this re-expansion after compression is relieved.

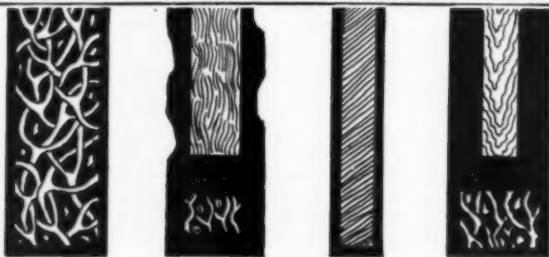
**Trapped Under Compression:** The print to the right is an example of oozing under compression. Due to the hard asphalt surfacing over the concrete base, the traffic could not carry the surplus away because it was locked in between the asphalt surfacing and base. The force was great enough, however, to form bulges in the hard asphalt surface.



**A Bituminous and Impregnated Fibre or Elastic Mass:** No better proof of indiscriminate oozing. No better illustration of the need of expansion joint of the proper kind. The action in this instance resembles that of paste in a tube being squeezed with one side open. Action of this kind causes tremendous waste, without resulting in good. Servicised Joints will prevent this.

Write Us About Your  
Expansion Joint  
Problems

Servicised Products Co.  
First National Bank Bldg.  
CHICAGO



TYPE B  
75% Bitumen  
25% Cellular Fibre

TYPE D  
Self-Expanding  
Non-Rusting

TYPE C  
Felt Center - Coated  
Sides - Sidewalk Joints

TYPE AA  
3/16 Veneer Coat

Four Types of Servicised Expansion Joints



in Which the Oozing Tendency Is Controlled

## Servicise the Crevice and Save the Road

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Riverside Bridge Co., Martins Ferry, O.  
Toledo Crane Co., Toledo, O.  
Virginia Bridge & Iron Co., Roanoke, Va.  
Wisc. Bridge & Iron Co., North Milwaukee, Wis.

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Holcomb Mfg. Co., J. I., Indianapolis, Ind.  
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Kendallville Broom & Brush Co., Kendallville, Ind.  
Lay Co., Jos., Ridgeville, Ind.  
Milwaukee Brush Mfg. Co., Milwaukee, Wis.  
Osborn Mfg. Co., Cleveland, Ohio.

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Weller Mfg. Co., Chicago, Ill.

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Browning Co., Cleveland, O.  
Byers Mach. Co., J. F., Ravenna, O.  
Hayward Co., New York.  
Industrial Works, Bay City, Mich.  
Kiesler Co., J. F., Chicago, Ill.  
Lakewood Engineering Co., Cleveland, O.  
Link-Belt Co., Chicago, Ill.  
Mead-Morrison Mfg. Co., E. Boston, Mass.  
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Owen Bucket Co., Cleveland, Ohio.  
Williams Co., G. H., Erie, Pa.

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\*Smith Co., T. L., Milwaukee, Wis.  
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Lakewood Engineering Co., Cleveland, O.  
Ransome Concrete Machy. Co., Dunellen, N. J.  
Union Iron Works, Inc., Hoboken, N. J.  
Weller Mfg. Co., Chicago, Ill.

## BUCKETS, DRAGLINE

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Brown Hoisting Mach. Co., Cleveland, O.  
Bucyrus Co., So. Milwaukee, Wis.  
Dobbie Fdry. & Mach. Co., Niagara Falls, N. Y.  
Hayward Co., New York.  
Industrial Works, Bay City, Mich.  
Link-Belt Co., Chicago, Ill.  
Monaghan Machine Co., Chicago, Ill.

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Brown Hoisting Mach. Co., Cleveland, O.  
Browning Co., Cleveland, O.  
Hayward Co., New York.  
Kiesler Co., J. F., Chicago, Ill.  
Lakewood Eng. Co., Cleveland, O.  
Mead-Morrison Mfg. Co., East Boston, Mass.  
Owen Bucket Co., Cleveland, Ohio.  
Williams Co., G. H., Erie, Pa.

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Kiesler Co., J. F., Chicago, Ill.  
McMyler Interstate Co., Cleveland, O.  
Mead-Morrison Mfg. Co., East Boston, Mass.

Orton & Steinbrenner Co., Chicago, Ill.  
Vulcan Iron Works, Jersey City, N. J.

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Reading Hardware Co., Reading, Pa.  
Russell & Erwin Mfg. Co., New Britain, Conn.  
Sargent & Co., New Haven, Conn.  
Stanley Works, New Britain, Conn.  
Yale & Towne Mfg. Co., New York.

## BUILDINGS, STEEL (See Bridges and Buildings)

## BUNKS AND COTS

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Haggard & Marcussen Co., Chicago, Ill.  
Southern Rome Co., Baltimore, Md.

## CABLES (See Wire and Cables)

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\*Street Bros. Mach. Wks., Chattanooga, Tenn.  
Broderick & Bascom Rope Co., St. Louis, Mo.  
Flory Mfg. Co., S., Bangor, Pa.  
Lidgerwood Manufacturing Co., New York.  
Mead-Morrison Mfg. Co., E. Boston, Mass.  
Roebeling Sons Co., J. A., Trenton, N. J.  
Waterbury Co., New York.

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Lackawanna Steel Co., Buffalo, N. Y.  
O'Rourke Eng. Constr. Co., New York.  
Petroleum Iron Works Co., Sharon, Pa.

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Somet-Solvay Co., Solvay, N. Y.  
Oow Chemical Co., Midland, Mich.

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Felt & Tarrant Mfg. Co., Chicago, Ill.  
Marchant Calc. Machine Co., Oakland, Cal.  
Monroe Calculating Machine Co., Orange, N. J.

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\*Rochester Can Co., Rochester, N. Y.  
American Can Co., New York.  
Butler Mfg. Co., Minneapolis, Minn.  
Safety Sanitary Rubbish Box Co., Columbus, O.  
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Austin Machinery Corp'n, Chicago, Ill.  
Chase Fdry. & Mfg. Co., Columbus, O.  
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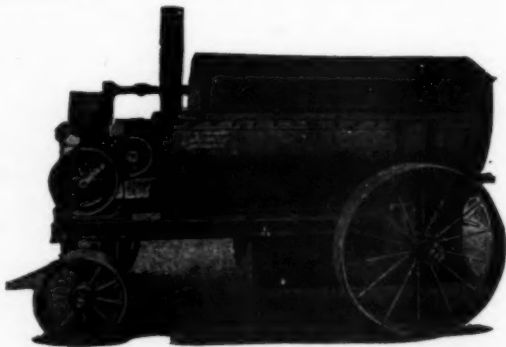


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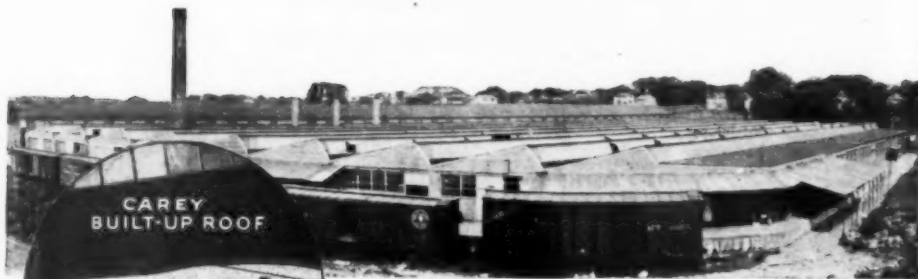
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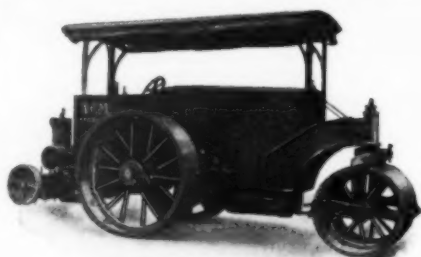
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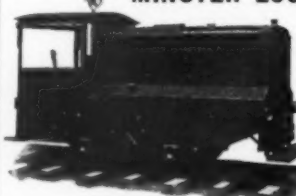
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 Burton Eng. & Mach. Co., Cincinnati, O.  
 Davenport Locomotive Works, Davenport, Ia.  
 Fate-Root-Heath Co., Plymouth, O.  
 Hadfield-Pensfield Steel Co., Bucyrus, O.  
 Lima Locomotive Wks., Lima, O.  
 Milwaukee Locomotive Mfg. Co., Milwaukee, Wis.  
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 Westinghouse Elec. & Mfg. Co., E. Pitts'gh, Pa.  
 Whitcomb Co., Geo. D., Rochelle, Ill.

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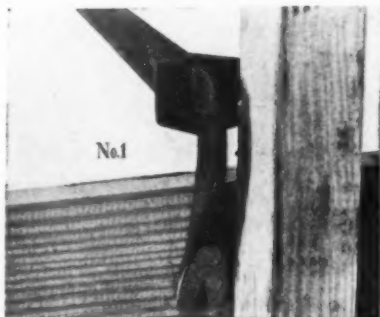
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 Crowell & Spencer Lumber Co., Long Leaf, La.  
 Exchange Sawmills Sales Co., Kansas City, Mo.  
 Great Southern Lumber Co., Bogalusa, La.  
 Industrial Lumber Co., Elizabeth, La.  
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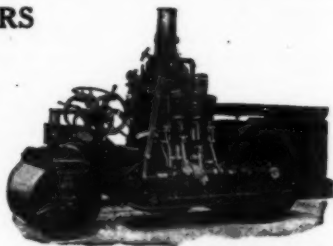
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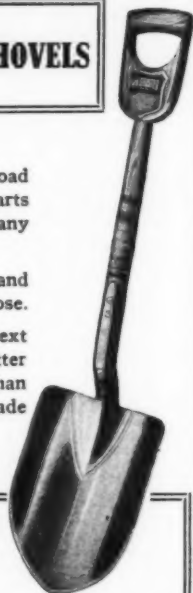


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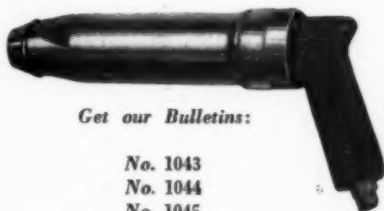
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Niagara Metal Stamp. Corp., Niagara Falls, N. Y.

## WATER MAIN CLEANING

\*National Water Main Cleaning Co., New York.

## WATER MAIN TAPPING MACHINES

Mueller Mfg. Co., H., Decatur, Ill.  
Smith Mfg. Co., A. P., East Orange, N. J.

## WATER METERS. (See Meters, Water.)

## WATERPROOFING COMPOUNDS AND MATERIAL

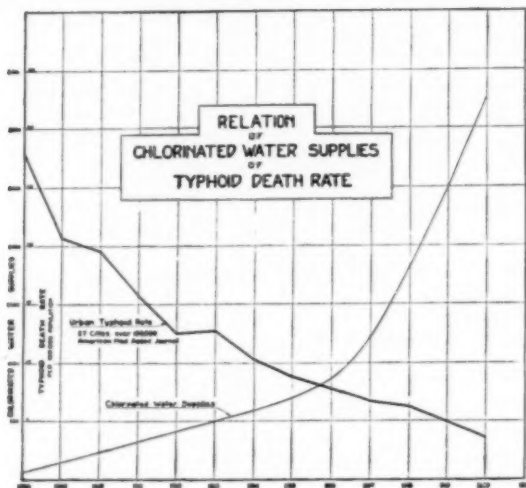
\*Barber Asphalt Co., Philadelphia, Pa.  
\*Carey Company, Philip, Cincinnati, O.  
\*Servicised Products Co., Chicago, Ill.  
\*Standard Oil Co. (Indiana), Chicago, Ill.  
\*Texas Company, New York.  
Anti-Hydro Waterproofing Co., Newark, N. J.  
Atlantic Refining & Asphalt Corp., Phil'a, Pa.  
Barrett Company, New York.  
General Fireproofing Co., Youngstown, O.  
Granitex Corp., New York.  
Horn Co., A. C., Long Island City, N. Y.  
Master Builders' Co., Cleveland, O.  
Minwax Co., The, New York.  
Protexol Corp., New York.  
Ruberoid Co., New York.  
Sonneborn Sons, Inc., New York.  
Tock Brothers, New York.  
Truscon Laboratories, Detroit, Mich.

## WATER PURIFICATION. (See also Filters.)

\*Wallace & Tiernan Co., Inc., Newark, N. J.  
Clow & Sons, J. B., Chicago, Ill.  
Electro Bleaching Gas Co., New York.  
Graver Corporation, E. Chicago, Ind.  
Mathieson Alkali Works, Inc., New York.  
Penna. Salt Mfg. Co., Philadelphia, Pa.  
R. U. V. Company, New York.

## WATER REGULATORS

\*Union Water Meter Co., Worcester, Mass.  
Mueller Mfg. Co., Decatur, Ill.  
Pacific Flush Tank Co., Chicago, Ill.



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## WATER SOFTENERS

American Water Softener Co., Philadelphia, Pa.  
Graver Corporation, E. Chicago, Ind.  
International Filter Co., Chicago, Ill.  
N. Y. Continental Jewell Filtr. Co., Nutley, N. J.  
Permutit Company, New York  
Pittsburgh Filter & Eng. Co., Pittsburgh, Pa.  
Refinite Co., Omaha, Neb.  
Roberts Filter Mfg. Co., Darby, Pa.  
Scaife & Sons, W. B., Pittsburgh, Pa.  
Wayne Tank & Pump Co., Ft. Wayne, Ind.

## WATER WHEELS

Allis-Chalmers Mfg. Co., Milwaukee, Wis.  
Leffel & Co., Jas., Springfield, O.  
Pelton Water Wheel Co., San Francisco, Cal.  
Smith Company, S. Morgan, York, Pa.

## WELDING APPARATUS

General Electric Co., Schenectady, N. Y.  
Milburn Company, Alex., Baltimore, Md.  
Oxweld Acetylene Co., Newark, N. J.

## WELL SCREENS

Cook, Inc., A. D., Lawrenceburg, Ind.  
Johnson, Edw. E., Inc., St. Paul, Minn.

## WELL-DRILLING AND BLAST HOLE MACHINES

\*Keystone Driller Co., Beaver Falls, Pa.  
American Well Works, Aurora, Ill.  
Armstrong Mfg. Co., Waterloo, Iowa.  
Leidecker Tool Co., Marietta, Ohio.  
Loomis Machine Co., Tiffin, O.  
Sanderson Cyclone Drill Co., Orrville, Ohio.  
Sparta Iron Wks. Co., Sparta, Wis.  
Star Drilling Machine Co., Akron, O.

## WHEELBARROWS

Akron Barrow Co., Cleveland, O.  
Jackson Mfg. Co., Harrisburg, Pa.  
Kilbourne & Jacobs Mfg. Co., Columbus, O.  
Lansing Co., Lansing, Mich.  
Sidney Steel Scraper Co., Sidney, O.  
Sterling Wheelbarrow Co., Milwaukee, Wis.  
Stuebner Iron Wks., G. L., Long Island City, N. Y.  
Toledo Wheelbarrow Co., Toledo, O.

## WINCHES

Bethlehem Shipbuilding Corp., Bethlehem, Pa.  
Clyde Iron Wks., Duluth, Minn.  
Dobbie Fdry. & Mach. Co., Niagara Falls, N. Y.  
Lidgerwood Mfg. Co., New York  
Mead-Morrison Mfg. Co., E. Boston, Mass.  
Mundy Hoisting Eng. Co., J. S., Newark, N. J.

## WINDOW FRAMES AND SASH. (Metallic.)

\*Truscon Steel Co., Youngstown, O.  
Bayley Co., Wm., Springfield, O.  
Detroit Steel Products Co., Detroit, Mich.  
Friedrich Co., E. H., Holyoke, Mass.  
Lupton's Sons Co., David, Philadelphia, Pa.  
McFarland Co., J. C., La Porte, Ind.  
Penn Metal Co., Boston, Mass.  
Sykes Co., Chicago, Ill.

## WIRE AND CABLE

American Steel & Wire Co., Chicago, Ill.  
General Electric Co., Schenectady, N. Y.  
Habirshaw Elec. Cable Co., Inc., N. Y. C.  
Hazard Mfg. Co., Wilkesbarre, Pa.  
Macwhyte Co., Kenosha, Wis.  
National India Rubber Co., Bristol, R. I.  
New York Insulated Wire Co., New York.  
Okonite Co., Passaic, N. J.  
Roehling's Sons Co., J. A., Trenton, N. J.  
Safety Ins. Wire & Cable Co., New York.  
Simplex Wire & Cable Co., Boston, Mass.  
Standard Underground Cable Co., Pittsburgh, Pa.  
Tubular Woven Fabric Co., Pawtucket, R. I.  
Waterbury Co., New York.

## WIRE GLASS

Mississippi Wire Glass Co., New York.

## WIRE MESH REINFORCEMENT

\*Truscon Steel Co., Youngstown, O.  
American Steel & Wire Co., Chicago, Ill.  
National Steel Fabric Co., Pittsburgh, Pa.  
Wickwire Spencer Steel Corp., New York.

## WIRE ROPE. (See Rope, Wire.)

## WOOD BLOCKS (See Paving Blocks)

## WOODWORKING MACHINES

Fairbanks, Morse & Co., Chicago, Ill.  
Ransome Concrete Mach. Co., Dunellen, N. J.

## WOOD PRESERVATIVES

Barrett Company, New York.  
General Chemical Co., New York.  
Protexol Corp., New York.  
Republic Creosoting Co., Indianapolis, Ind.  
Truscon Laboratories, Detroit, Mich.

## WRECKING BARS

\*Anderson Bros. Mfg. Co., Rockford, Ill.

## WRENCHES

Erie Tool Works, Erie, Pa.  
Greene, Tweed & Co., New York.  
Greenfield Tap & Die Corp., Greenfield, Mass.  
Lowell Wrench Co., Worcester, Mass.

# The Value of Catalogs to a Contractor

Modern catalogs, in addition to carrying the sales argument of the manufacturer, frequently contain cost data, construction methods, and tables for estimating, which are of great value to the reader. Contractors should carefully read over the list of catalogs on pages 61 and 62 and secure such material as will benefit them in their work.

\* Indicates that the manufacturer carries an advertisement. See index facing inside back cover.

## *The Winter Shovel*

The Thew gasoline is THE winter shovel.

It has the same range and flexibility as the Thew steam shovel. Except for gearing to a single source of power it is identical in design and construction.

Of course the continuous tread truck has real power steer and two speeds. The steering is done from the cab.

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## Storing Construction Equipment in Winter

How the George J. Grant Construction Company Does It

THE way in which construction machinery is stored and taken care of when not in use has a vital bearing on the way it will perform when put back into service, and also on the time required to get it ready for use after it has lain in storage for some time. It isn't reasonable to expect that when you dump a timber derrick on the ground with all the metal parts attached and make no effort to protect either metal or timber from the elements, you can go out in the spring and find your derrick all shipshape and ready to set up and put to work. Even if nothing has been stolen, the timbers are liable to be checked and warped, the metal parts rusted, and the sheaves seized on their shafts. All of which means, of course, that it will take time and money to put the derrick back into good working order.

Or, take the case of a hoisting engine which has been hauled in from a job and "stored" out in the open with the stack open to all the weather that a versatile climate can brew; the

shafts and other bright metal parts unprotected and the brass fittings left on to gladden some pilferer's heart.

No one in his right mind would think of leaving several thousand dollars in cash kicking around some back lot, and it is scarcely less pardonable to do the same thing with expensive equipment. Hoisting machinery can be stored adequately without going to much expense either for storage sheds or yard space. The storage yard and sheds of the George J. Grant Construction Company, at St. Paul, Minn., are good examples of satisfactory storage facilities provided at moderate cost.

The site of the George J. Grant storage yard is a level sandy tract formerly the site of the company's sand and gravel operation, from which about 500,000 cubic yards of sand and gravel were taken. After the sand and gravel had all been removed down to the street level and the operation was worked out, the Grant Company fenced off a section of it, erected stor-



GENERAL VIEW OF THE GRANT COMPANY'S STORAGE YARD

age sheds, etc., and established it as a storage yard for their contracting equipment. The level, sandy nature of the soil insured good drainage, and the plot is conveniently located with reference to railroads and paved streets.

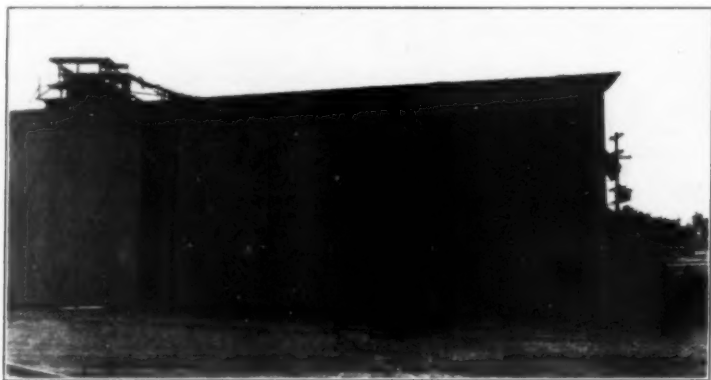
At this place are located the company's carpenter shop, machine shop, blacksmith shop, tool house, garage and storage sheds for derricks, hoisting engines, etc. Incoming and outgoing machinery is handled by an American wooden stiff-leg derrick operated by an American steam hoisting engine.

The item of wooden stiff-leg derricks alone presents a real problem in storing and handling at the plant of the George J. Grant Company, for they have 25 of these derricks. As soon as any of these rigs come back from a job they are taken apart and given two coats of battle-ship gray. The paint used is pure white lead and oil, with enough lampblack added to produce the gray color. After being painted, all the metal parts are removed and oiled thor-

taken to place them so that any belly or sag acquired in service will be gradually corrected by the weight of the timbers in the pile. This is done by piling the timbers so that the sag will curve upward.

When a hoisting engine comes in off a job, it is taken to the machine shop, knocked down and overhauled. This work is done by machinists who have worked in the shops of the American Hoist and Derrick Company, and are familiar with the hoists. All the fittings are removed and oiled with heavy lubricating oil, after which they are packed in marked and numbered boxes, so that they can be found readily when it is desired to reassemble the engine.

In order to protect the hoist during its period of idleness, the bearings are oiled to prevent rusting, the cylinder head is removed and the cylinder wiped dry on the inside and coated with oil to prevent rusting. Packing is removed from stuffing boxes to keep the rods from rusting.



ONE END OF THE ENGINE STORAGE SHEDS, SHOWING HOISTING ENGINE IN WINTER QUARTERS

oughly with heavy lubricating oil, after which they are marked and stored in the tool house.

The timbers are taken to the timber storage shed, a structure 150 feet long, 50 feet wide, and open at the ends to give ventilation and to permit teams and trucks to be driven through. The shed is built of wood, with corrugated iron sides, and the roof is covered with roofing paper. The shed frame is made of good-sized timbers and is strongly braced and supported. The main upright timbers are 14 by 14's, which support five iron cross-beams by means of which, and a hand-power crab, the derrick timbers are loaded and unloaded.

Five large iron beams are used as sills on which the timbers are piled. Five cross-pieces of 2 by 4, 9 feet apart, are placed between the tiers of timbers. This, of course, is to insure that the air will circulate freely around the timbers, keeping them thoroughly dry.

When timbers are piled in the shed, care is

All bright parts of the engine, such as the piston rod, connecting rod, crank disc, etc., are slushed with heavy grease. This grease coating is a good rust preventive, but it has a tendency to thin out on the upper sides of the parts. A better preparation, if the machine is apt to be in storage for a considerable length of time, is a mixture of white lead and tallow melted together. This coating will prevent rusting and stay in place until it is desired to remove it. It can be taken off readily with kerosene.

The boilers and frames of the hoists are stored in a weather-tight shed 400 feet long and 50 feet wide. This shed is covered with corrugated iron and is substantially built to keep out prowlers. Before the boilers are drained, a quantity of crude oil is put in on top of the water, which is then allowed to run out slowly. As the water level sinks, a coating of oil is left on the tubes and plates, effectually protecting them against rust.

Dinky locomotives, concrete mixers, gasoline engines, etc., are stored in the same shed as the hoisting engines. The cabs of the steam shovels stored out in the yard are made as weather-tight as possible, and all small parts are removed and stored in the tool house. Form timbers, wheelbarrows and similar equipment are stored in the open, but care is taken in stacking this material to prevent deterioration during storage.

All small equipment, such as shovels, picks, hammers, wire rope blocks, guy tighteners, Crosby clips, etc., is stored in the tool house. Every piece is cleaned and oiled and put away carefully. All Crosby clips are removed from the wire rope, cleaned and oiled, and the nuts are worked back and forth a few times to make sure that the oil covers the threads of the U-bolt. After this the clips are slung on a wire and hung up where they will be kept dry and in good condition. Sheaves are cleaned and oiled and piled on shelves. Wire rope is lubricated and carefully coiled or stored on reels.

About twenty men are employed around the shops and yards during the winter months. This number includes machinists, carpenters, barn men and laborers. Three men are employed at

the storage plant all year round, doing odd jobs, such as repairing wagons and wheelbarrows, sorting lumber, etc.

Perhaps the most unique feature of this well-arranged and well-managed equipment store-yard is the watchmen who protect the stored equipment from thieves and prowlers. These watchmen are Airedale and police dogs; all alert, sharp-toothed, and fast as greased lightning. They are trained as watchmen from puppyhood, and know their business from A to Z. Each dog has its beat, which it traverses on runway chains, that is a chain with a ring over a long trolley wire.

The orders of the day for each "purp" on guard duty are roughly as follows:

First, to take charge of his post and all other property in view.

Second, to watch his post in a wide-awake manner, keeping always on the alert and observing everything which takes place within sight or hearing.

It is scarcely necessary to add that these orders are carried out to the fullest extent and that thieves give the George J. Grant yard a wide berth.

ACKNOWLEDGMENT.—Illustrations by courtesy of American Hoist and Derrick Company.

## Sanding Slippery Streets and Sidewalks

THE time is approaching when street superintendents and other municipal officials will think seriously of sanding streets, particularly on grades, to prevent the slipping of horses and trucks. This "safety first" expedient is repaid many times in freedom from accident.

Warren Brothers Company, 9 Cambridge Street, Boston, Mass., manufactures a stone- and sand-spreading cart which evenly spreads a thin film of sand or grit on a pavement, throwing the material to a considerable distance in all directions. This cart, which is substantially constructed, can be handled by one man. It is equipped with a galvanized sheet steel body, large-diameter wheels and small pilot wheel for balancing it when standing.

The sand or grit falls through an opening in the bottom of the carrying hopper upon a revolving cone, which throws it uniformly over the surface of the street. The distributing cone is revolved by means of a chain and sprockets, the sprockets on the counter-shaft being equipped with a friction clutch, which permits throwing the revolving mechanism out of gear when carrying a loaded cart from the source of supply to the area to be sanded,

and also when moving the empty carts about. This considerably minimizes the labor of hauling the cart. The flow of sand from the carrying pan to the revolving cone is controlled by means of a lever extending to the left hand of the operator. The cart distributes the sand much more evenly and economically than can be done by straight hand labor.



A ONE-MAN SANDING CART

## Book Reviews

### LUMBER, ITS MANUFACTURE AND DISTRIBUTION

Ralph Clement Bryant, F.E., M.A., Manufacturers' Association Professor of Lumbering, Yale University. John Wiley & Sons, Inc., New York. 1922. XXI + 539 pp. Diagrams, illustrations and tables. \$4.50.

No contractor making considerable use of lumber can afford to be without an all-round knowledge of its production, manufacture and distribution. Mr. Bryant has prepared what is virtually a text-book on lumber manufacture and distribution. It is divided into three parts, the first dealing with plant location and the standard types of equipment used in the manufacture of lumber and the methods of handling it at the sawmill. The second part treats primarily of the technique of the industry, including the methods of lumber manufacture, seasoning, re-manufacture, products of the lumber industry, mill refuse and its disposal. The third part deals with the economic problems of lumber distribution and the activities of lumber-trade organizations. This is a book to be specially recommended to general contractors and to building contractors.

### THE BUILDING LABOR CALCULATOR: A COST SYSTEM FOR THE USE OF ARCHITECTS, CONTRACTORS, ENGINEERS AND APPRAISERS

Gordon M. Taublyn, author and publisher, Sweeney Building, Denver, Colo., 1922. \$5. This is a very well-arranged loose-leaf booklet of 58 pages containing what the author has termed "constants of labor." In spite of the variability of labor's output, there is a law of averages which, if carefully tabulated, makes estimating exceedingly accurate. In the same manner in which insurance companies base their premiums on averages, the contractor or engineer is enabled to make estimates of labor with great accuracy through the use of this book. The material required for a specific structure is admitted to be a fixed quantity, whereas the number of hours of labor expended in direction of this quality of material varies from time to time for reasons well known to employers. The Building Labor Calculator contains information on the labor and material required in brick work, various kinds of carpenter work, concrete work, excavations, heating, lathing and furring, marble work, plastering, painting, roofing, sheet metal, sheet piling, stone work, terra cotta, tile floor arches and tile partitions. In addition to this loose-leaf booklet, a supplementary monthly service may be secured for \$5 per year.

### WHO'S WHO IN ENGINEERING—A BIOGRAPHICAL DICTIONARY OF CONTEMPORARIES

John William Leonard, John W. Leonard Corporation, Brooklyn, N. Y., 1922. 1,509 pp. \$10.00.

An interesting and valuable reference book which covers with considerable range the leaders in the engineering field. This book is an outcome of the endeavor to give the engineering profession a correct and valuable compendium of personal and professional information concerning as large a number of engineers as could be covered from available data. The volume is almost entirely original in its contents. Every one of the 10,500 engineers listed, with the exception of about 50, responded personally to a questionnaire submitted to them. The gathering of the information represents faithful, strenuous labor extending over two years. The book is entirely free of commercial taint, as there is not a single paid line in the volume. As a matter of convenience, the present addresses, business and residence, of each engineer are given immediately after his name, instead of following the older custom of placing the name at the head and the address at the end of the biography. The editor of this volume is well known for his similar standard volumes in other professional lines.

### FORMS, RECORDS AND REPORTS IN PERSONNEL ADMINISTRATION

C. N. Hitchcock, Editor, The University of Chicago Press, Chicago. 1922. 128 pp. Paper bound, \$1.79, postpaid.

This volume presents a series of representative forms, records and reports drawn from the personnel departments of many establishments of widely differing character. The selection of material has been made with a view to suggesting to the student of administration the kind of information which various corporations have found of most value in determining and effectively administering their policies, and some possible methods of presenting it for administrative use. The small book is divided into seven main parts corresponding to the larger phases of the work of the personnel department. The first division deals with the organization of functions and includes two large charts which present two different views of personnel organization. The second features the forms and records for the employment phase of this work, the third shows the forms used by the training section, and the fourth those used for recording illness and accidents, the results of physical examinations and other information necessary to the health and safety division. Part V shows forms and records at the disposal of the research and planning section, and Part VI has miscellaneous forms on profit-sharing contracts and reports to employees on profits distributed. The last part gives statistical reports for managerial use. The contractor will find a large number of suggestions which should prove very helpful in working out individual forms for contracting use.

### CEMENTS, LIMES AND PLASTERS—THEIR MATERIALS, MANUFACTURE AND PROPERTIES

Edwin C. Eckel. Second Edition. John Wiley & Sons, Inc., New York. 1922. XXXI + 655 pp. Illustrations, diagrams and tables. Price \$6.50.

A particularly interesting book on the non-metallic structural materials which are used by engineers and contractors under the head of cementing materials. Considerable stress is laid on manufacturing methods, on the general chemical and physical principles underlying these methods, and the rapid increase in the use of cement, lime and plaster in the United States. In this revision of the first edition of the book less space is given to natural cement than heretofore, and the space thus saved is used to advantage in amplifying the discussion of the other materials. The introduction gives a well-prepared history of the chief cementing materials, their relative importance and growth, the general trend of costs and prices, the classifications and relationship of cementing materials and their choice, as well as chemical, physical and geological data.

In the first part of the book, under the subject of plasters, the author discusses the composition, distribution and excavation of gypsum, the chemistry of its burning in the manufacture of plaster, and the composition, properties and tests of plasters, and then gives a chapter on flooring plasters and hard finish plasters. The portion of the book devoted to limes describes their manufacture and use and also the properties of lime and brick. Part III discusses the magnesia and oxychloride cements, Part IV the hydraulic limes, selenitic limes and grappier cements, and Part V natural cements. Part VI covers portland cement, starting with limestones in general, then argillaceous limestones, cement rock, fresh water marls, alkali waste, blast-furnace slag, clays, shales and slates, the excavating of the raw material, the calculation and proportioning of the mix, and the details of its manufacture, cost, prices and productions and specifications. The concluding portion of the book takes up puzzolan cements, including slag cement and the necessary treatment of the slag for a satisfactory product, as well as the manufacture of slag bricks and slag blocks.

## LEGAL POINTS FOR CONTRACTORS

These brief abstracts of legal decisions in the contracting fields may aid you in avoiding similar difficulties. Local ordinances or state laws may alter the conditions in your community. If in doubt, consult your lawyer

**Edited by A. L. H. Street, Attorney-at-Law**

### Effect of Owner's Termination of Contract

A building contractor is not to be charged for delay in the completion of a building after his employment has been terminated in accordance with the terms of the contract, holds the Connecticut Supreme Court of Errors in the case of *Valente vs. Chieppo*, 117 Atlantic Reporter, 807. By electing to terminate the contract the owner discharges him from further responsibility.

### Contractor's Special Bond Supersedes General Bond in Part

Where a public contractor gives a general bond to faithfully perform his agreement, and also a special statutory bond for the benefit of materialmen and laborers, a materialman is deprived of any recourse under the general bond, to which he might have resorted excepting for the giving of the special bond, holds the California District Court of Appeal in the case of *Maryland Casualty Company vs. Shafer*, 208 Pacific Reporter, 192. And it is decided that if a materialman lose his right to proceed under the special bond through failure to perfect his claim in due time he cannot fall back on the general bond.

### When No Price Is Agreed Upon

There was insufficient proof to entitle a dealer in building materials to recover the prices charged, holds the Nebraska Supreme Court in the case of *Seybolt vs. Waters*, 189 Northwestern Reporter, 980.

Plaintiff sued on an account for materials furnished on the order of plaintiff, and testified at the trial that the various items were furnished and that an account exhibited was "correct." But there was no proof that the parties ever agreed to the prices charged or that those prices represented the reasonable value of the materials. The Court said:

"The 'items' in the account might have been 'correct,' but that does not establish or prove that the charges were reasonable and just. Before book accounts can be introduced in evidence under the statute, they must be shown to be 'just and true.' Much more should proof be required of this nature of an action when the books are not in evidence. In the absence of any agreement as to the price of goods sold and delivered, there is an implied agreement that the prices shall be reasonable. Proof that they are reasonable is an indispensable requisite to recovery upon such an implied promise."

### Low Compensation as Excuse for Poor Workmanship

The contractor is subject to an important legal principle that has been applied to various lines of business and professions. It has been decided that a physician cannot excuse malpractice on the ground that he was not adequately paid for treating the case. And it has been held by the courts that a lawyer will not be permitted to avoid liability for damages resulting through negligent handling of professional business, on the ground that he received but a nominal fee. Applying the same underlying principle, in the recent case of *Falk vs. Nitz*, 189 Northwestern Reporter, 921, in which plaintiffs sued for compensation for construction work and the defendants counterclaimed for damages because the contract was not fulfilled as to character of workmanship, the Michigan Supreme Court said:

"The plaintiffs excuse this by saying that the labor performed and materials furnished were worth much more than the contract price; that the parties contemplated a cheap job; a kind of work commensurate with the price to be paid for it. The plaintiffs may have been unfortunate in estimating the amount of labor and materials necessary for the completion of the work according to the plans and specifications; nevertheless, they must be held to a substantial compliance with the provisions of their contract, which required the work to be done in a workmanlike manner."

### Responsibility for Exposing Explosives to Youthful Trespassers

In the case of *Terrell vs. J. F. Giddings & Son*, 112 Southeastern Reporter, 914, decided by the Georgia Court of Appeals, it appeared that defendants had a contract to grade a public road. Their representative in charge of the work left a dynamite cap, in a box and wrapped in paper, near the mouth of a sewer on the road. A boy twelve years old, being attracted by the package, carried it to the home of the plaintiff, another youth. In playing with the cap, plaintiff scratched it with a pin, causing an explosion which injured him.

The Court holds that absence of blame on plaintiff's part does not necessarily establish that the accident was due to defendant's actionable fault, "since an accident may be a mere casualty, for which no one is to blame."

But it is decided that a jury reasonably might find that defendants were negligent, through their representative, in failing to foresee that by leaving the cap exposed, as it was, some



child might be attracted by it and be injured in tampering with the explosive. It is also held that the intervening act of the first child in conveying the cap to plaintiff's home can not be held to so far break the causal connection between defendants' negligence and plaintiff's injury as to defeat liability on defendants' part.

The Court notes that reasons assigned in other cases for exonerating from liability, where a trespasser on private property has been injured through possessing himself with some dangerous instrumentality, cannot be applied in a case like this, where the instrumentality has been exposed in a public place.

#### **When Children Trespass Upon Piles of Material**

What the West Virginia Supreme Court of Appeals lately decided in favor of a lot owner would appear to apply with equal force to a case where it might be sought to hold a contractor liable under similar circumstances. (*Martino vs. Rotondi*, 113 Southeastern Reporter, 760.)

Defendant owned a lot with a retaining wall 4 feet high abutting upon a sidewalk in the street in front. He caused several heavy timbers to be placed near the edge of the wall on his property. Children playing there without his knowledge or consent displaced the material, and one of the timbers fell upon plaintiff's decedent, killing her.

In holding that defendant was not liable, the Supreme Court of Appeals said:

"It cannot be said that there is anything negligent in one storing upon his own premises lumber or other materials to be used in the construction of houses or other structures thereon, unless they are so piled or stored as that they are liable to fall and do an injury to those lawfully on the public ways. Where the injury results from the interference of some independent agency without the defendant's authority, it cannot be said that he is contributing thereto. He is entitled to the reasonable use of his property, and if one is injured because of the interference of a third party therewith, he must look to such third party for compensation for the injury, and not to the owner of the property, who is in no wise at fault."

#### **Effect of Mistake in Ordering Discontinuance of Work**

A county court, having awarded several contracts for road improvements, adopted an order for discontinuance of work, but later adopted a supplemental order stating that the original order was not intended to apply to a certain improvement for which plaintiffs had a contract, and which was in process of construction. Plaintiffs, however, treating the original order as having released them from obligation to proceed, refused to complete the work. The county had the work done by a new contractor and counterclaimed against plaintiffs for increased cost of the improvement, when plaintiffs sought to recover for work done by them before either order was adopted by the County Court.

The United States Circuit Court of Appeals,

Fourth Circuit, holds (*Winston vs. Wyoming County Court*, 282 Federal Reporter, 472) that plaintiffs were not released from the contract because they had done nothing in reliance upon the original order before it was revoked. The Court says:

"This is not the case where one party repudiates a contract and afterwards attempts to recall the repudiation, but rather the case where one party makes a mistake, of which the other party seeks to take advantage. And the rule of law to be here applied, as we apprehend, is this: If plaintiffs knew, or should have known, before they disqualified themselves from completing the contract, or the situation had otherwise materially changed to their detriment, that the first order was not intended to suspend the work in question, they cannot justly claim release from their obligation."

#### **Contractor's Rights Under Partly Performed Contract**

In the case of *Feldschau vs. Clatsop County*, 208 Pacific Reporter, 764, the Oregon Supreme Court considered the rights of a contractor who had not completed construction of a highway according to agreement. Laying down a rule applicable to all construction contracts, the Court observes:

"Where the contract and the consideration are both entire [where a single improvement is to be constructed for a lump sum], and no price is stipulated in the contract to be paid for anything less than complete performance, and there has been a part performance by one party to the contract which has been of benefit to and has been accepted by the other, the rule in this state is that the party who has partly performed his contract is entitled to recover on quantum meruit [a reasonable price] for the part performed, less such damages as the other party may have sustained by reason of his failure to complete performance. But where the contract stipulates the rates and prices to be paid for that which has been done under the contract, then the right of such party to recover for part performance is limited and restricted to the rates and prices fixed by the contract. In the first instance the party is permitted to recover on quantum meruit for the reason that in the nature of things there can be no other measure of recovery than that of reasonable value; while in the latter case, the parties are and should be bound by the rates and prices which they themselves have agreed should be paid therefor."

#### **Osgood Establishes New York Offices**

The Osgood Company, Marion, Ohio, manufacturer of steam shovels, has established a district sales office at 50 Church Street, New York City, with M. E. Pullen in charge. This new district office will take care of all the business formerly handled by M. E. Davis in New York City.

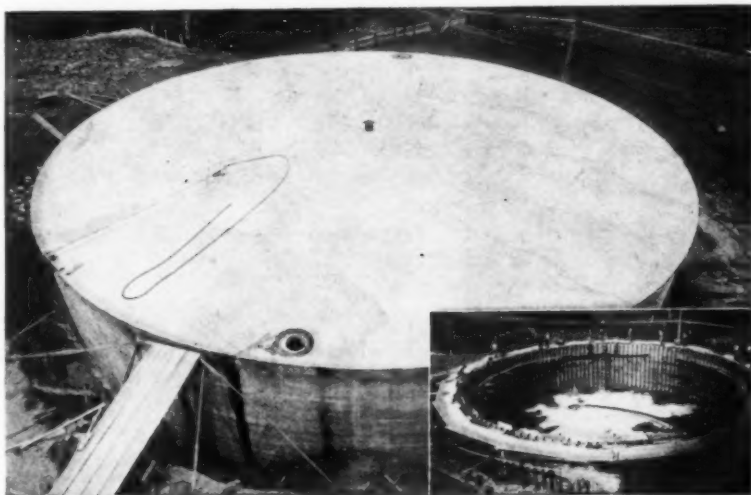
## Interesting Concrete Reservoirs and Tanks

Used in Industrial Plants and for Cities

**I**N 1918 Dallas, Texas, completed a 500,000-gallon reinforced concrete water tank at its Oak Cliff pumping-station. This tank, which is circular, has an internal diameter of 72 feet and a depth of 16½ feet. The walls are 12 inches thick and rest on footings 18 by 4 inches. The tank floor is 8 inches thick, reinforced both top and bottom. This was considered necessary because of the unstable foundation conditions.

water from its various beet sugar manufacturing operations. This water is afterwards evaporated to a heavy sirup and then incinerated to an ash, from which the potash is recovered.

The reservoir is hexagonal. Each of the six sides of the bottom is 300 feet long. The inside slope is 2 to 1 and the outside slope 1½ to 1. The reservoir is 30 feet deep and has a capacity of 8,000,000 cubic feet. A small vertical wall 12 inches high is an added pre-



**A 500,000-GALLON REINFORCED CONCRETE RESERVOIR BUILT AT THE OAK CLIFF PUMPING STATION, DALLAS, TEXAS**

The inset shows the construction in progress. The tank has vertical sides; the position of the camera when taking the picture caused the distortion

The 4-inch roof slab laps over 15 concrete columns, spaced 18 feet one way and 12 feet the other. Five lines of T-beams, 11 by 14 inches, with 18-foot spans, spaced 12 feet on centers, form the remainder of the roof structure. This tank required 363½ cubic yards of 1:2:3 concrete and about 55,000 pounds of steel. Earthwork approximated 1,500 yards of excavation and 300 yards of back fill under the floor.

### Concrete Reservoir for Industrial Plant

One of the first firms to take up the recovery of potash as a by-product of other manufacturing processes was the Great Western Sugar Company, which has plants at various points in Nebraska and Colorado. At Scottsbluff, Nebr., the company has built a large concrete-lined reservoir on its farm about one-half mile south and west of its factory, to store waste

caution against any possible erosion due to wave action. The actual area occupied by the reservoir to the top of the outside embankment is 10.8 acres. The entire reservoir is floored with 4 inches of reinforced concrete laid in slabs 13 feet square. Concrete on the side slopes was laid in belts 15 feet wide and 4 inches thick, vertically up the slopes, with expansion joints at the point where the earth filling joined the natural ground, and another half-way between this point and the top. All joints, both in the floor and in the sides of the reservoir, have a concrete sill underneath, 12 inches wide and 4 inches thick.

### Concrete Tanks for Fuel Oil Storage

In order to insure an adequate supply of fuel oil, storage should be provided for from 30 to 60 days' consumption. This capacity safeguards

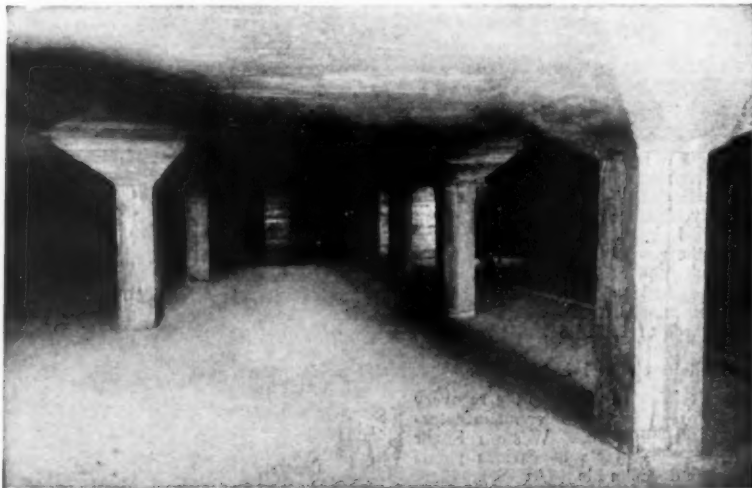


**A 650,000-GALLON CONCRETE OIL STORAGE TANK AT THE WEST LYNN, MASS., PLANT OF THE GENERAL ELECTRIC COMPANY**

against irregularity of supply and consequent shortage during periods of transportation congestion. As approximately four barrels of oil are equal to a ton of coal in fuel value, much greater capacity would be required for coal for the same period. Insurance underwriters favor the underground concrete tanks for the storage of fuel oil, because fire hazards are greatly reduced. The recent investigation of concrete tanks for fuel storage shows that there are 314 plants having 481 tanks, representing a total capacity of 882,494,600 gallons. The interior construction and exterior appearance of tanks of this type are shown in the accompanying illustrations.

#### **Slip Forms Used on Circular Reservoir**

A \$2,000,000 reservoir recently completed at Arkansas City, Kans., has some interesting features of design and construction. The reservoir was constructed to provide a reserve and equalizing storage between the supply wells and the high-service pumps located approximately  $1\frac{1}{4}$  miles from the site of the well system. A site available for the reservoir was a low patch of ground adjacent to the pump station, owned by the city for park and playground purposes, but never improved. It had been used as a dump and was partially filled with refuse, bricks, tin cans, street sweepings and rubbish. The re-

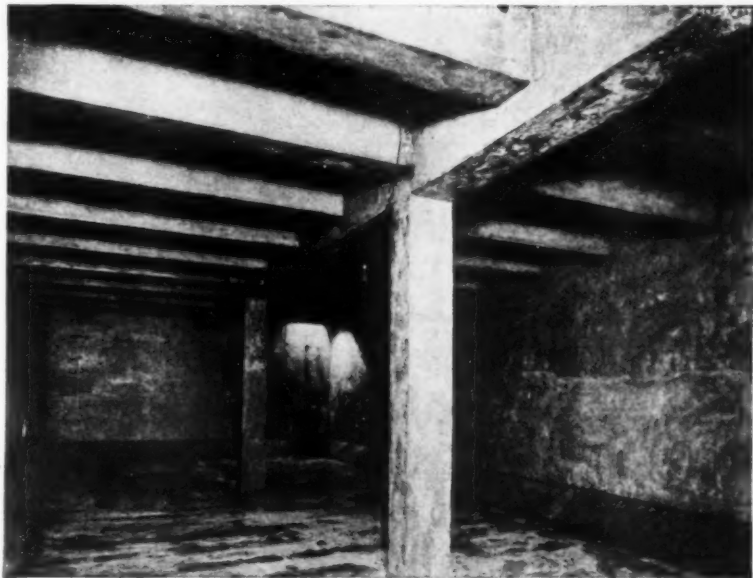


**INTERIOR VIEW OF A 160,000-GALLON FUEL OIL TANK OF THE STEEL CAR FORGE COMPANY, ELWOOD CITY, PA.**

sults of preliminary test borings indicated approximately an average of 8 feet of old fill and original loam and 2 feet of water-bearing sand, overlying a solid limestone stratum. The reservoir was designed to use this rock stratum for the floor. Upon removing the top soil, the rock surface was found to be fairly smooth and level, having a grade or dip of approximately 0.8 of 1 per cent. Several faults or cracks,  $\frac{1}{4}$  to 1 inch wide, averaging 20 feet apart and running at right angles to each other, were cleaned out and grouted full of 1:2 cement mortar, and after chipping off some of the

form thickness in order to use slip forms. The ring tension steel was placed in two rows and held firmly in the proper place by vertical standards spaced 6 feet on centers, made of 3-inch channels with notched strap steel bars, riveted at the proper intervals.

The wall forms were made of 1-inch shift lap in sections 12 feet long and 12 feet high. After receiving a coat of paint, they were assembled and centered in place. The forms were filled within 6 inches of the top and then were raised slowly by means of the ordinary slip form jacks, operating on 1-inch jack rods,



**INTERIOR VIEW OF A 150,000-GALLON CONCRETE OIL TANK OF THE JENKS SPINNING COMPANY, PAWTUCKET, R. I.**

This tank being depressed in the ground with only the roof exposed, its contents are protected against temperature changes

irregular or uneven places, the entire rock surface was washed with cement grouting, making a satisfactory floor or bottom.

The reservoir is 156 feet inside diameter and 14 feet deep below the overflow weir. The design is of the ring tension type, with the walls resting on a sub-footing keyed into the rock stratum forming the bottom. The wall is separated from the footing by a specially designed expansion joint in order to eliminate cantilever stresses. The roof is a 5-inch reinforced concrete slab, carried by 10 x 15-inch beams, spaced 12 feet on centers each way and supported by 10 x 10-inch columns. The roof was given an 8-inch slope from center to wall, and the top was given a floor or sidewalk smooth trowel or float finish.

The wall was originally designed tapering from bottom to top, but was changed to a uni-

form which were cut off at the top of the wall when the concreting of the wall was complete. Two men were employed to operate the jacks, making a complete circuit twice an hour and raising the forms approximately 1 inch each time.

The concrete was run continuously in the walls, using two mixers located on opposite sides and alternating from one mixer to the other every hour. There were three 8-hour shifts of men, consisting of 10 laborers and foreman mixing and placing concrete, 3 men placing and wiring steel, 2 men operating form jacks, and 2 carpenters shifting runways and doing miscellaneous work. The total time required for the wall was 80 hours. The concrete was conveyed from the mixer to the wall in wheelbarrows on board runs.

The use of slip forms with the concrete deposited continuously in small layers allowed the

concrete to be well puddled. When the wall was finished, no construction joints, voids or pockets were visible and the finish was very smooth. The walls showed no signs of seepage when the reservoir was filled.

The column footings were keyed into the rock stratum, and the top was carefully graded from center to outside walls to conform to the roof slope, so that all column forms were of the same length, thus simplifying the construction and placing of forms.

#### Covered Reservoir Saves Money for City

The city of Dubuque, Iowa, recently completed a 7,500,000-gallon covered reservoir, located on an eminence 250 feet above the business center of the city and a few blocks away from the main factory and business places. This concrete reservoir with a slightly arched cover is 180 feet in diameter and 41 feet in depth. The cost for the reservoir proper was \$82,000, and the concrete cover cost \$32,000, a total of \$114,000. The reservoir itself was constructed several years ago and because of the open top it was almost impossible to keep the water clean. In summer it was necessary to clean the tank about every ten days, thus placing a considerable fire hazard upon the city when the tank was out of commission. This made the reservoir an expensive proposition through labor and the loss of water incident to the cleaning process.

The reservoir was hewn from practically solid rock and thus a saving of \$80,000 was effected through its location at the present site. Proposals made at the time it was contemplated, favored a high bluff, adjacent to the waterworks plant and removed from the territory to be served by more than two miles. With friction losses so high in pumping such a distance, the engineers determined the greater value of the present site overlooking the business artery of the city, obviating the necessity of pumping the water a second time.

In constructing the reservoir, the contractors were confronted with a limestone rock and homogeneous clay formation. A circular reservoir was decided upon because of excellent approach to the property, the plat, and the allowance for a new high-service pumping station to be built in the future. The reservoir bottom was made level with the rock stratum and with only enough pitch to drain. The lower wall was built solidly against the rock. Despite the fact that the upper portions of the wall were surrounded with clay and rock to the top, the wall was made just as strong as though no earth were to be placed against it. A thin wall practically without horizontal reinforcement was erected wherever it was against solid rock. Stresses in the wall above the rock were transmitted to solid rock by means of buttresses. Steel dams  $\frac{1}{4}$  by 8 inches to prevent seepage were provided for 4-foot concrete wall sections extending without break around the reservoir.

## Rubber Roads Invented in England

Special Type of Rubber Block Pavements Developed for Traffic Running on Rubber Tires

A NEW type of rubber composition paving block has been developed in England which it is claimed can be placed on the market at a price to compete with the ordinary creosoted wood block, when it is taken into consideration that the composition blocks are noiseless and have an estimated life of 15 years. Two types of blocks have been produced, one made with a core, surfaced with a  $\frac{1}{2}$ -inch hard vulcanized rubber, and a second consisting of the core only. The principal ingredients of the core, which have been patented, are rubber, jute, and china clay. These ingredients enable the whole block to be vulcanized in one piece, as it has been found by experiment that the block should be a solid mass and not made up of separate superimposed portions. When the block has been hollowed out and filled with concrete or wood to reduce cost, it has been found that the rubber surface creeps and shows wear on the underside at the place of contact and not on the surface.

In an experiment with a wooden block, upon which a steel plate was placed as a seat for a rubber surface, it was found that the heavy traffic turned up the steel plate at the edges. At St. Pancras railway station, London, the covered way under the hotel is surfaced with a sheet of rubber about  $\frac{1}{4}$ -inch thickness. It is claimed that there is a tendency for the rubber sheet to "lick up," so that it must be pegged down from time to time. As a result of their experiments, manufacturers have decided that the separate solid blocks give the best results. The block proposed is similar to the wooden block used ordinarily for street paving, and measures  $9 \times 4\frac{1}{2} \times 3$  inches.

Up to the present time it has not been possible to manufacture rubber blocks at less than three times the cost of wood paving, which is about \$5.40 per square yard. The Gould block core is claimed to be made at 4 cents per pound, and it is expected that the price of paving will not be more than \$13.34 per square yard.

### Who Manufactures Tractors and Trailers?

Frequently you are confronted with the question of who makes a specific kind of equipment. By consulting the "Where to Purchase" directory beginning on page 3 of the CONTRACTORS' AND ENGINEERS' MONTHLY your query is quickly answered.



## Status of Non-Resident Construction Corporations

By A. L. H. Street

**N**O corporation engaged in construction work should undertake performance of a contract in a state other than that where it was incorporated without first ascertaining what limitations and conditions are there imposed against non-resident corporations, or "foreign" corporations, as such companies are more commonly termed.

A corporate contractor does not possess the same freedom of action in transacting domestic business in a state other than that of its abode as does the individual contractor. Primarily, a corporation has no existence in contemplation of law beyond the borders of the state by which it was created. If it goes into another state to do business there, it may be required to secure a permit to do so. And most, if not all, of the states have laws requiring permits to be obtained.

A standard legal authority, summarizing decisions of the highest courts, observes that "only two exceptions or qualifications have been attached to the power of a state to exclude foreign corporations from coming into the state and doing business there. One of these qualifications is that the state cannot exclude from its limits a corporation engaged in interstate or foreign commerce; the other limitation on the power of the state is where the corporation is an agency or instrumentality in the employment of the Federal Government."—(14a Corpus Juris, 1248.)

Application of the first exception may be illustrated by a case where an Indiana corporation has contracted to supply a building contractor with stone to be shipped from that state to Illinois. This being an interstate transaction, over which Congress has exclusive control, the state into which the stone is shipped cannot require the stone company to obtain a license to do business there before it may deliver the material there and collect what is due.

The second exception appears to be aptly exemplified by a case where the Federal Government has awarded to a New York corporation a contract to construct a post-office building in California. In performing that contract the corporate contractor does not become subject to the laws of California, requiring foreign companies to obtain license before doing business in the state.

But where a foreign company undertakes the construction of works for an individual, a partnership, another corporation, the state, or some subdivision of the state, as in the case of the ordinary construction contract, there seems to be no room for doubt but the company is amen-

able to the foreign corporation laws of the state.

Although the provisions of the several state laws differ materially, the common requirements made against foreign corporations are the payment of license fees, filing of copies of articles of incorporation, designation of local agents on whom legal process may be served, and the filing of financial statements. In some states taxes are levied on the domestic earnings of foreign companies. Information concerning the specific requirements in particular states is usually obtainable by addressing the local secretary of state, concerning conditions on which doing of business is permitted, and the state tax commission, concerning levy of taxes on domestic earnings, etc.

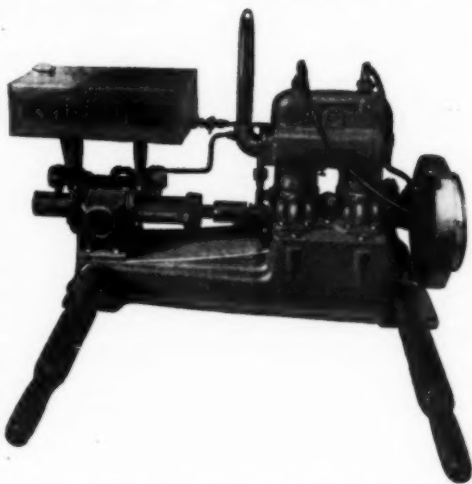
No general rule can readily be stated covering the effect of doing business in a state without being licensed to do so, for the point is affected by widely differing statutory provisions and court decisions. But probably it has been held in most of the states that failure to comply with requirements for a permit to do business and to designate an agent for service of process invalidates a local contract, at least against attempt to enforce it in the local courts. So many of the states impose such drastic penalties as preventing enforcement in their courts of rights claimed under domestic contracts that it behooves every non-resident corporation to fully inform itself on local legal requirements and on the penalties imposed for non-compliance before going into another state to do domestic business there.

In passing, it is interesting to note that the United States Supreme Court recently decided in the case of Robert Mitchell Furniture Company vs. Selden Breck Construction Company, 42 Supreme Court Reports, 84, that defendant, a Missouri corporation, through having appointed an agent in Ohio for service of process on it and through filing an annual report in Ohio, as required of foreign companies doing business there, did not subject itself to suit in Ohio on a contract to be performed in Michigan. In that case it appeared that the construction company had not done any work in Ohio since 1918, although it filed a report with the state in 1919. The company contended that the mere fact that it might have desired to preserve an opportunity for reentering Ohio did not make its watching for possible business there such act as subjected it to the jurisdiction of the Ohio courts. Without directly passing on this contention, the Supreme Court takes the narrower ground that even if the company was technically present in Ohio it was not amenable to suit there on a transaction arising elsewhere.

## A New Portable Pump for Contractors

**T**HE Evinrude Motor Company, Milwaukee, Wis., has brought out a new pumping outfit which weighs less than 100 pounds complete and which has a capacity of 2,400 gallons per hour at a 70-pound pressure, and 900 gallons per hour at 155 pounds pressure. This pump at a head of 277 feet, or through 1 1-3 miles of 1½-inch pipe, will deliver 1,500 gallons per hour. At a pressure of 120 pounds, it will throw a stream 100 feet through a ¾-inch nozzle. This demonstrates its value to contractors for pumping water to a mixer from any considerable distance.

The pump is a small Viking special internal gear affair direct-connected to an Evinrude 4-5 horse-power, 2-cylinder, 2-cycle motor, equipped with standard Evinrude magneto. The pump and the motor are mounted on a strong aluminum base and measure 31 inches long, 11½ inches wide, and 17 inches high. The pump has a 2-inch suction and a 1½-inch discharge. The outfit weighs 99½ pounds and can readily be carried by two men. Bolt holes are provided in the base for permanent installation, if desired.



THIS PUMP CAN BE QUICKLY MOVED BY  
TWO MEN

## A New Electric Sifter of High Capacity

**A** RECENT development in an electric sifter which has been brought out by J. D. Wallace & Co., 1401-1417 West Jackson Boulevard, Chicago, Ill., for foundry use and for dry and liquid chemicals should be of great interest to many contractors. This electric sifter can sift a ton of moist molding sand in four minutes through a No. 2 riddle, delivering the sand thoroughly cleaned and thoroughly mixed. Two workmen shoveling at top speed

could not keep the new electric sifter running at full capacity, and a dozen men sifting by hand could not do anywhere nearly as much work.

The light weight of the sifter permits it to be hung from any convenient spot at any desired height. The sifter has a vibration of only 5/16-inch from its vertical position, so that it is not necessary for the workmen to dodge about to catch the riddle with their shovelfuls of sand. The capacity of this sifter is a direct result of the unusual electric motor which is connected direct to the riddle. The motor is a vertical G. E. outfit in which the armature and shaft remain stationary and the field and housing revolve at 1,800 r.p.m. The weighting of the housing on one side creates an extremely rapid and regular vibratory motion similar to that of an eccentric fly-wheel. Because of the direct connection of the motor to the riddle, a minimum of power is required, since no power is lost through transmission or friction and because the motor is completely equipped with specially designed ball bearings of the self-oiling type.

The motor is enclosed in a dust- and grit-proof casing, and cooling air is circulated about the motor by its own motion. Air is drawn into the top of one arm of the supporting frame tubing, and after circulating around the motor is expelled at the top of another arm. A valve trap in the air intake prevents dust and dirt from entering the motor.



THIS SIFTER KEEPS TWO MEN HUSTLING

# ASSOCIATED GENERAL CONTRACTORS

## NEWS NOTES AND COMMENTS

### Better Equipment

Through Cooperation of Manufacturers and General Contractors

**P**ROBLEMS arising out of the relations of equipment manufacturers and general contractors were considered at the fall meet-

ing of the Executive and Advisory Boards and Presidents' Council of the Associated General Contractors of America, an entire session being devoted to the joint conference. Forty-three representatives of leading equipment manufacturers' firms were present at the conference, and more than 175 others showed their keen interest in it by writing to the Associated General Contractors and requesting that they be advised of the results of the meeting.

#### Vigorous Discussion

During the conference discussion was vigorously presented by leaders on both sides; in fact, the afternoon session was brought to a close with only part of those who had signified their desire to participate having been heard. The discussion was resumed after dinner, however.

The conference, both in spirit and in substance, was a surprise to contractors and manufacturers alike. Its success convinced all present that it was a move in the right direction, and that every effort should be made to put into action the suggestions offered. Similar conferences with material manufacturers and with subcontractors were suggested.

#### Joint Committee Appointed

The great practical accomplishment of the session was the adoption of a resolution offered

by C. E. Bement, of the Novo Engine Company of Lansing, Mich., for a joint committee of 15, "consisting of the chairman, or anyone he may designate to act for him, and seven manufacturers' representatives and seven general contractors, to consider the subjects discussed and prepare recommendations on them, to be submitted to the manufacturers and contractors and to be considered at another joint conference to be held at a time and place to be determined by the Committee." The Committee includes:

C. E. Bement, Novo Engine Company, Lansing, Mich., Chairman.

H. B. Bushnell, Western Wheeled Scraper Company, Aurora, Ill.

Phillip Koehring, The Koehring Company, Milwaukee, Wis.

F. H. King, Marion Steam Shovel Company, Marion, Ohio.

H. H. Baker, Sterling Wheelbarrow Company, Milwaukee, Wis.

H. W. Howard, General Motors Truck Company, Pontiac, Mich.

C. D. MacArthur, Blaw-Knox Company, Pittsburgh, Pa.

Stanley D. Moore, Moore-Young Construction Company, Waterloo, Iowa.

W. A. Rogers, Bates & Rogers Construction Company, Chicago, Ill.

A. P. Greensfelder, Fruin-Colson Contracting Company, St. Louis, Mo.

William D. Hill, Samuel Gamble Company, Carnegie, Pa.

Frederick L. Cranford, Inc., Brooklyn, N. Y.

G. B. Walbridge, Walbridge-Aldinger Company, De-

#### SUMMARY OF SUGGESTIONS OFFERED AT JOINT CONFERENCE

##### FOR CONTRACTORS

- (a) In opening field offices
  1. Notify manufacturer of such action.
  2. Advise manufacturer to honor field superintendent's orders.
  3. Advise manufacturer what machinery will be used in this territory.
  4. Get new repair catalogs for all machinery used on the job.
- (b) Specify distinctly in all repair part orders, by letters or telegraph, name and address of home office, number of machine and of part, type of machine, description of part.
- (c) Give credit information on subcontractors to facilitate shipments of repair parts.
- (d) Help manufacturers work out improvements on machinery.
- (e) Make suggestions on how repair parts catalogs may be saved.
- (f) Standardize scope of local and national organization publications.

##### FOR MANUFACTURERS

- (a) Number all parts.
- (b) Place metal tag on machine listing numbers of more important parts.
- (c) Send two repair parts catalogs with each shipment of new machines, one with machine and one to home office.
- (d) Provide protected place in machine for repair parts catalog.
- (e) Supply more information regarding spare parts.
- (f) Publish no misleading cost data in advertisements.
- (g) Make arrangements to ship all repair part orders same day.
- (h) Print all catalogs and other matter standard size for filing.
- (i) When in doubt about size or style of part ordered, ship all and allow contractor to return what is not needed.
- (j) Ship to job such repair parts as might be needed, and allow contractor to return those not used.

##### FOR BOTH

- (a) Adopt standard specifications for shovels, concrete mixers, steam shovels, locomotive cranes, hoisting engines, grading equipment, road graders, dump-wagons, etc., etc.
- (b) Adopt standard repair part order card for use in ordering new parts.
- (c) Secure standardization of requirements of public works departments of different states.

troit, Mich.

Frederick Ward, Ward and Tully, Inc., Brooklyn, N. Y.

R. C. Marshall, Jr., Associated General Contractors, Washington, D. C.

Arthur S. Bent and C. W. Lundoff were of the original number appointed, but on account of exacting committee work and other official duties they were unable to accept and Frederick Ward and R. C. Marshall, Jr., were appointed instead.

At the close of the evening session a meeting of the Joint Committee was held. It was the consensus of opinion that each member should ascertain from the group he represented what were their suggestions for action by the Committee and should file them with the chairman, and that copies of the minutes of the Joint Conference should be sent to all present at the conference, with the request that further suggestions be filed with the Committee.

### A. G. C. Biographies

*W. A. Rogers* was born January 19, 1868, and was graduated from the University of Wisconsin in the class of 1888. He started his construction career in the engineering departments of the Wisconsin Central, Northern Pacific, and Chicago, Milwaukee & St. Paul Railroads. With Onward Bates, Past President of the American Society of Civil Engineers, he organized Bates & Rogers Construction Company. They started out as masonry and bridge contractors, but soon broadened their field to take up all forms of railroad, public works, roads, industrial plant construction, and hydro-electric development and river work.



W. A. ROGERS

Mr. Rogers was president of the Associated General Contractors during 1920, and is now a member of the Board of Directors.



THOMAS BENTLEY

*Thomas Bentley*, after trying his hand at being a grocery clerk, a plumber, a carpenter, a hoisting engineer, a general foreman, a bookkeeper, and an estimator, decided to be a contractor, and in 1900 went into partnership with his father and brother to build office buildings, churches and residences. In 1907, the A. Bentley & Sons Company was organized and he was elected president. To-day the company is one of the leading construction firms of the Middle West, employing three thousand men and maintaining five district offices. Its contracts include office buildings, industrial and filtration plants, shipyards, etc.

A. G. C. Convention  
Los Angeles, California  
January 30—February 2

# WHAT YOU WANT

The catalogs and pamphlets listed below are available for free distribution. Contractors and Engineers who check over these pages each month and write for such material as interests them, will find this a valuable means of keeping up to date on the subject of machinery and equipment.

# WHEN YOU WANT IT!

## CALCIUM CHLORIDE FOR CURING CONCRETE

Complete information regarding the economy and advantages of the use of granulated calcium chloride in curing concrete roads may be secured from the Semet-Solway Co., Syracuse, N. Y.

## WATER-TIGHT SEWERS ASSURED

The Waring-Underwood Co., Commercial Trust Bldg., Philadelphia, Pa., will be pleased to send to contractors full information regarding "Ideal" sewer joint compound, which assures water-tight sewers when used according to instructions.

## INDUSTRIAL TYPE LOCOMOTIVES

Minster locomotives, made in any gage and from 2 to 8 tons capacity for contracting service, are described in detail in the catalog of the Industrial Equipment Co., 910-916 Ohio St., Minster, Ohio.

## PROTECTIVE PAINTS FOR METAL WORK

The Parr Paint and Color Co., 665-669 E. 103rd St., Cleveland, Ohio, has issued interesting literature and a color card for its "Metalseal" paint for steel structures.

## PAVING COUNTRY ROADS

The latest booklet of the Standard Oil Co., of Indiana, 904 S. Michigan ave., Chicago, Ill., contains much information of interest and value to contractors and street superintendents on the laying of country roads which will stand up well.

## DIAPHRAGM TRENCH PUMPS

Contractors looking for effective hand or gasoline-operated diaphragm trench pumps should secure a copy of catalog 60, Bulletin D, of the Edson Mfg. Co., 375 Broadway, Boston, Mass.

## CONCRETE MIXERS FOR SPEEDY JOBS

In its latest catalog, 405-B, the T. L. Smith Co., 1022 32nd st., Milwaukee, Wis., describes the Smith 7-8 mixers, which can be quickly moved from one place to another and which keep the concrete gang hustling.

## SIDEWALK, CURB AND CUTTER FORMS

The Marsh-Capron Co., Chicago, Ill., has issued a very complete 8-page booklet describing in detail the uses of Hotchkiss sidewalk, curb and gutter forms and illustrating various problems which they solve effectively.

## EFFICIENT ROCK DRILLS

The catalog of the Denver Rock Drill Mfg. Co., Denver, Colo., describes in detail the advantages of the Waugh rock drill as well as this company's complete line of drill sharpeners, hoists and compressor outfits.

## GRADERS AND GRADER SCARIFIERS

Catalog No. 21-F, issued by the Austin-Western Road Machinery Co., Chicago, Ill., describes in detail AW graders and grader scarifiers in 14 models, from the Midget, which weighs 1,000 pounds, to No. 20, which weighs 9,000 pounds.

## THE CHOICE OF SHOVELS FOR CONTRACTORS

The Pittsburgh Shovel Co., Oliver Bldg., Pittsburgh, Pa., will be pleased to send information to contractors telling why Pittsburgh shovels have been the choice of contractors in all parts of the country for many years.

## FREE LOOSE-LEAF BINDER FOR THEW BULLETINS

The Thew Shovel Co., Lorain, Ohio, has just issued a loose-leaf binder which fits its numerous bulletins and enables contractors to keep them together. Contractors not having a complete set of Thew power shovel bulletins may secure them with the binder free of charge.

## KNOCK-DOWN SECTIONAL STEEL BUILDINGS

The latest catalog issued by the Blaw-Knox Co., Pittsburgh, Pa., on its Prudential sectional steel buildings contains a great deal of information regarding their use which contractors would find valuable for ready reference.

## MISCELLANEOUS EQUIPMENT FOR CONTRACTORS

W. B. Spencer, 30 Church St., New York City, has a valuable list of second-hand equipment which has been carefully inspected and tested and is guaranteed to be as represented, including boilers, compressors, concrete mixers and machinery, hoisting engines and swingers, pumps, steam rollers, steam shovels and miscellaneous equipment.

## MATERIAL HANDLING WITH PORTABLE LOADERS

The Link Belt Co., 910 S. Michigan Ave., Chicago, Ill., has just brought a new portable loader catalog, No. 550, describing the different types of Link Belt portable loaders and their various uses in contracting service.

## TRACTORS AND TRUCKS FOR HARD WORK

In a well-illustrated 8-page booklet entitled, "Twin City Road Builders," the Twin City Co., Minneapolis, Minn., describes in detail its complete line of 12-20 and 20-35 tractors as well as its 2- and 3½-ton trucks for road-building service.

## SPEEDY UNLOADING

The rate at which you can unload your dump trucks is a factor that seriously affects the earning power of your trucks. In the booklet, "Bodies for Road Builders," the Heil Co., 1243 26th Ave., Milwaukee, Wis., describes in detail the various types of Heil partitioned bodies and hoists, which expedite unloading and save labor.

## BITUMINOUS MACADAM HIGHWAYS

Contractors considering bidding on bituminous macadam types of highways in the coming season will do well to secure a copy of the latest booklet of the Asphalt Sales Dept., of the Texas Co., 17 Battery Pl., New York City, on this type of road construction.

## TANDEM PAVING ROLLERS

Paving rollers, guaranteed against breakage or wear for five years, and made strong, simple and easy to operate, are described in detail in the illustrated catalog of the Erie Machine Shops, Erie, Pa.

## STEAM AND MOTOR ROAD ROLLERS

Catalog A, which may be secured from the Buffalo-Springfield Roller Co., Springfield, Ohio, describes in detail Buffalo-Pitts and Kelly-Springfield rollers in the steam and motor types, with or without scarifier attachments.



**REDUCED MIXER PRICES**

The American Cement Machine Co., Inc., Keokuk, Iowa, has announced that its 1923 prices and terms, which are available now for contractors, have smashed mixer prices. Its latest catalog gives its prices and describes in detail its all-steel Boss mixers and heavy-duty hoists.

**CURB BARS WITH POSITIVE ANCHORAGE**

The Truscon Steel Co., Youngstown, Ohio, will send on request to any contractors literature describing Truscon concrete curb bars with positive anchorage, which prevent separating or splitting of the concrete at corners.

**SNOW-PLOWS AND ROAD MACHINERY**

The complete catalog of the Good Roads Machinery Co., Inc., Kennett Square, Pa., describes in detail the full line of Champion snow-plows and road machinery which have proved their worth through many years of service.

**WRECKING-BARS**

An efficient type of wrecking-bar for use in taking down concrete building forms and staging is described in detail in literature which may be secured from the Anderson Bros. Mfg. Co., 1911 Kishwaukee St., Rockford, Ill.

**DEPENDABLE LOCOMOTIVES**

The H. K. Porter Co., Pittsburgh, Pa., manufacturers of Porter locomotives for contractors over a period of 57 years, will be pleased to send their descriptive literature on request.

**WAGON LOADERS**

The material equipment, including clam-shell buckets and the well-known Haisa wagon loaders, is described in detail in the literature of the George Haisa Mfg. Co., 142nd St. and Park Ave., New York City.

**STREET FLUSHERS AND SPRINKLERS**

The Municipal Supply Co., South Bend, Ind., will send on request full details regarding the South Bend "Studebaker Model" street flusher and sprinkler for mounting on any standard 5-ton truck.

**REPAIRING SHEET ASPHALT PAVEMENTS**

The illustrated literature of the Equitable Asphalt Maintenance Co., 1901 Campbell St., Kansas City, Mo., describes in detail the new Lutz surface heater which this company has recently brought out for the economical heating of asphalt and other bituminous pavements to enable the contractor to make a perfect bond between the old and the new material.

**EXPANSION JOINTS THAT SAVE THE ROAD**

In the literature of the Serviced Products Co., First National Bank Bldg., Chicago, Ill., contractors will find a complete description of the four types of Serviced expansion joints for concrete and block type roads, in which the coving tendency common among expansion joints is controlled.

**TRACTORS FOR SPRING ROAD CONSTRUCTION**

In "Monarch Facts" you will find the complete story of Monarch Tractors, Inc., Watertown, Wis., telling of the Monarch industrial tractor and its value to the contractor in handling road machinery and solving the multitude of hauling problems which arise every construction season.

**15- TO 100-TON JACKS**

The Doughboy Jack, described in Bulletin 30 of the McKiernan-Terry Drill Co., 19 Park Row, New York City, is one which is good for every job and never turns around nor backs down.

**DRAGLINE CABLEWAY EXCAVATORS**

In their latest illustrated booklet, Sauermaier Bros., 1143 Monadnock Bldg., Chicago, Ill., describe in detail their small-sized dragline cableway excavators, which will enable a pit owner to market 100 tons or less per day economically and at a profit.

**LONG-LIVED PAINTS**

In booklet 148-B, the Joseph Dixon Crucible Co., Jersey City, N. J., describes in detail the advantages of Dixon's silica graphite paint for painting structural steel work, tanks and metal roofs.

**CAST IRON PIPE AND FITTINGS**

The descriptive literature of the United States Cast Iron Pipe and Foundry Co., Burlington, N. J., tells in detail of its standard cast iron pipe and fittings and also gives accounts of special work which it has done for municipalities.

**GRADING WITHOUT TEAMS**

The literature of the Cleveland Tractor Co., 19211 Euclid Ave., Cleveland, Ohio, tells how the Model "W" industrial Cletracs have been used in grading new sites and additions to sites for school buildings and other structures and have entirely done away with the use of horses.

**ASPHALT FILLERS FOR BRICK PAVEMENTS**

The Pioneer Asphalt Co., Lawrenceville, Ill., will be pleased to send full information describing Pioneer filler asphalt for brick pavements to any interested contractors or paving engineers.

**A FOUR-CYLINDER MOTOR ROAD ROLLER**

In the literature of the Acme Road Machinery Co., Frankfort, N. Y., contractors will find a description of the new Acme four-cylinder motor road roller with air-pressure controlled scarifier.

**C. I. PIPE LINES WITHOUT CALKING**

The literature of the Central Foundry Co., 41 E. 42nd St., New York City, describes in detail the use of Universal cast iron pipe for water lines without calking, packing or bell holes.

**HIGH-QUALITY, QUICK-LIFT GRADERS**

The 1923 literature of the Stockland Road Machinery Co., 3313 27th St., East, Minneapolis, Minn., describes in detail the features which have made Stockland quick-lift graders stand for so many contractors.

**DIRT ROADS AT LESS COST**

Contractors will be interested in the facts and figures regarding the York power stone rake for making better dirt roads at less expense, described in the literature of the York Modern Corp., Unadilla, N. Y.

**TRACTORS FOR ALL JOBS**

The illustrated booklet, "Caterpillar Performance," describes in detail the manifold uses of the Holt caterpillar tractor, made by the Holt Mfg. Co., Inc., Peoria, Ill.

**HEAVY-DUTY PAVERS**

Pavers of 7, 10, 14, 21 and 32 cubic feet capacities of mixed concrete, operated either by steam or by gasoline, are described in catalog P-6, which may be secured from the Koehring Co., Milwaukee, Wis.

**VERSATILE STEAM SHOVELS**

The versatility of the Keystone traction steam shovel with three interchangeable scoops, including the skimmer, ditcher and clam-shell for road grading, trenching, back-filling, cellar digging, pit mining, loading, unloading and handling materials, is described in detail in the literature of the Keystone Driller Co., Beaver Falls, Pa.

**PNEUMATIC BUSHING AND DRILLING TOOLS**

Bulletins Nos. 1043, 1044, and 1045, issued by the Thos. H. Dallett Co., Philadelphia, Pa., describe in detail the complete Dallett line of pneumatically operated tools for surfacing and drilling all concrete surfaces.

**TAR AND ASPHALT HEATERS**

Non-leakable tar and asphalt heaters in 20 styles from 10 to 1,000 gallons capacities are described in detail in the illustrated literature of Connery & Co., Inc., 4000 N. Second St., Philadelphia, Pa.

**SALAMANDERS FOR COLD-WEATHER USE**

Contractors and builders on construction jobs and buildings can secure information at once regarding Littleford salamanders, which keep concrete from freezing. Specifications and prices may be secured from Littleford Bros., 500 E. Pearl St., Cincinnati, Ohio.

**TRACTORS WITH EXTRA POWER**

The catalog and folders issued by the C. L. Best Tractor Co., San Leandro, Calif., describe in detail the services which Best tractors have rendered on closely figured contracts through many years of hard work.

**CULVERTS WITH GREAT STRENGTH**

Not only is a culvert called upon to carry water, but the superimposed loads must be taken care of. The illustrated literature of the Newport Culvert Co., 542 W. Tenth St., Newport, Ky., tells how these corrugated culverts are made of genuine open hearth iron to carry loads which would collapse other types of culverts.

**DISTRIBUTORS FOR BITUMINOUS MATERIALS**

The patent combination auto heater and distributor made by the Kinney Mfg. Co., 3529 Washington St., Boston, Mass., for heating and applying all kinds of bituminous materials, either hot or cold, to roads is described in literature which may be secured free on request from this company.

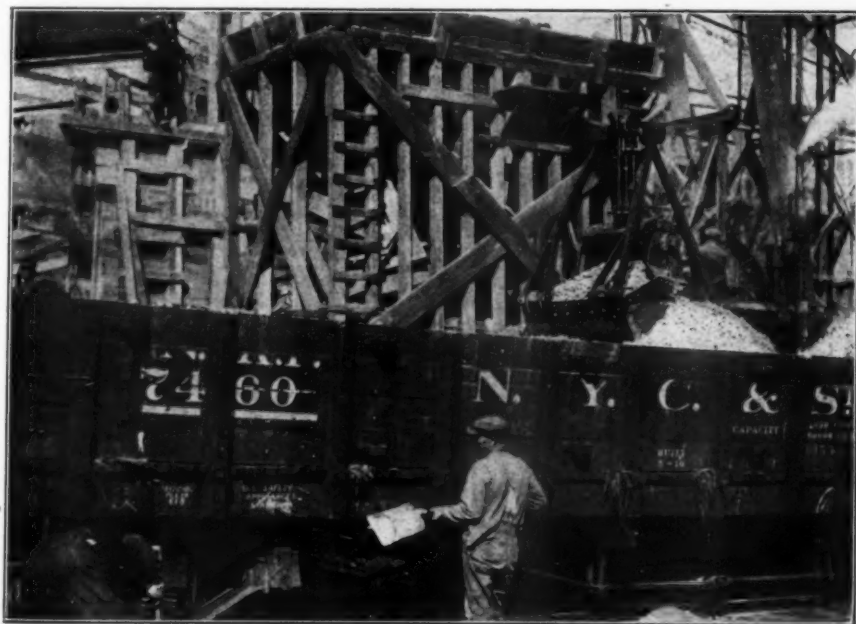


## Contractor's Machinery in Service



**A NORTHWEST FULL CATERPILLAR FOUR-CYLINDER GASOLINE CRANE BEING USED BY STERNBERG-POWELL COMPANY, CHICAGO, ILL.**

This crane, which was sold by George F. Smith Company, St. Louis, Mo., is being used for loading and unloading material for a concrete paver at Granite City, Ill.



**UNLOADING CRUSHED STONE WITH AN OWEN BUCKET FOR BUILDING CONSTRUCTION**

## Fall Lettings of Public Works Contracts

CONTRACTS let in the 27 northeastern states for the construction of public works and public utilities, as reported by the F. W. Dodge Company, and as summarized in *Index*, amount on the average to about one-fifth of all contracts. This class of contract, however, has not benefited as much by the recent boom in construction as have some of the other classes, particularly residential building, and as a consequence, while contracts for public works and public utilities were between 22 and 23 per cent by value of all contracts for the years 1919, 1920 and 1921, they are only 17.7 per cent of all contracts for the first nine months of 1922.

The first diagram shows how the value of contracts let has varied in the four months beginning with 1919. The figures for the first nine months of this year were 18 per cent greater than for the same period last year, but 2 per cent less than for the first nine months of 1922.

This is a marked contrast to the figures for all contracts shown in the second diagram. Here the figures for the first nine months of 1922 exceed those for the same period in 1920 by 24 per cent, and they are also greater than for the entire value of contracts for the preceding three years. As a matter of fact, they are greater than for any preceding twelve months in history.

The third diagram shows how contracts for public works and public utilities have varied month by month during the last four years. These contract lettings are extremely seasonal, even more so than contracts in general, the figures for the four winter months being particularly small. The diagram may perhaps indicate some improvement in the year 1921, caused by the campaign for fall lettings. At any rate, the figures for November and December taken together were greater than for the corresponding months of either of the two previous years. The difference, however, is not sufficient to be convincing proof

that any real change has taken place in regard to the customary time of letting contracts.

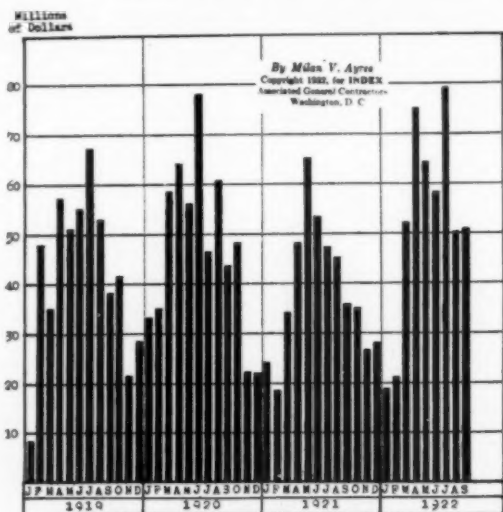
In each of the previous three years, the September figures fell very considerably below those of August, while this year September slightly exceeded August. If this may be taken as an indication of what is to be recorded for the last three months of the year, then indeed we shall be convinced that fall lettings have become a reality.



CONTRACTS LET FOR PUBLIC WORKS AND PUBLIC UTILITIES



VALUE OF ALL CONTRACTS LET



THE WHOLE STORY OF CONTRACT LETTING

# The Widest Concrete Street in the World

Keene, N. H., Makes This Claim—Who Can Dispute It?

A CONCRETE street running through Keene, N. H., was completed about a year ago at a cost of \$2.58 per square yard. This street, which is 140 feet wide, making it the widest in the United States, covers an area of 12,000 square yards and replaced a worn-out, hole-filled muddy road which required constant attention by the street department.

Because of the lack of maintenance brought about by war conditions, the streets of Keene, N. H., like those of many other cities, ap-

parts crushed New Hampshire granite, clean and uniformly well-graded. In the construction of this road, Heltzel steel forms were used and a Koehring 10E, 2-bag mixer, produced the concrete.

Half of the 140-foot width on Main Street was laid at a time and divided longitudinally into three sections by plain butt joints. All slabs are laid directly on the soil, as it was found after excavation to proper grade that no preparation of the subsoil grade was necessary



**BUILDING THE 140-FOOT CONCRETE STREET IN KEENE, N. H.**

proached ruin to an extent that meant practically a reconstruction of the whole without any salvage of the remnants, and there was lack of stability in the base that would scarcely permit of patching to withstand motor traffic any length of time. Therefore it became necessary to pave these streets with concrete to eliminate costly maintenance. In 1920, an appropriation of \$18,000 was made for permanent highways, but owing to the impossibility of obtaining material early enough to complete the work before cold weather, the work was deferred. Following this, a careful scrutiny was made of all types of roads, resulting in a contract being let to the Portland Construction Company, Portland, Me., for this reinforced concrete pavement. The entire street is 7 inches thick, reinforced with Wickwire-Spencer steel mesh. All transverse joints are laid with Elastite, and the road is constructed of a mixture of one part portland cement to two parts sand and three

other than proper rolling. At the street crossings for pedestrians, a 10-foot strip was laid with darkened mixture made by putting two pounds of lampblack per bag of cement into the mixer and placing it two inches thick on the surface to define the safety lanes. A considerable area of vitrified bricks supported by concrete foundation was removed and replaced with reinforced concrete in order to lay to the established grade. Wide granite block gutters that were rough in surface and difficult to keep clean, were removed and replaced by new concrete paving.

Local material was available for the bulky parts of the pavement. The sand is of good quality, and the crushed granite was trucked in from the Webb quarries six miles away. This pavement has been called a concrete-granite pavement because 66 per cent of it is crushed New Hampshire granite, and has opened up a new market for this material, for which the

state is celebrated. For many years granite has been exported for various uses and trap rock imported from Massachusetts for macadam roads. The principal reason why New Hampshire granite is not used for macadam road surfacing is because it pulverizes under 10-ton rollers, thereby preventing proper penetration in building; and, again, there is an internal friction in macadam roads that causes undue wear under swift heavy trucks. These trucks were restricted to 3 tons gross load in 1921 to save the inadequate roads where the soil in many places was reduced to a state approaching fluidity from rains.

On the other hand, granite when incorporated with cement mixture is an ideal road slab which has no internal wear, consequently New Hampshire is doing well to use in her concrete roads the local waste granite which has accumulated

in pyramidal piles for years. Its salvage into concrete granite roads is like receiving a new dollar for an old one to all granite dealers, and it represents an investment to the state, as well as a saving to the taxpayer.

New Hampshire fortunately possesses an unlimited supply of this useful granite, which is an igneous rock of crystalline structure composed of interlocking grains of quartz, feldspar and mica or hornblende, and while its texture varies to some extent, it is a rock that is especially adapted to concrete road work because of its sharp character.

Winfield M. Chaplin, Superintendent of Highways, Keene, N. H., had charge of this work and the Portland Construction Company, Portland, Me., were the contractors for the job, and the paver and other equipment were sold by Clyde R. Dodge, 141 Milk Street, Boston, Mass.

## Calcium Chloride in Concrete Road Construction

**C**ALCIUM chloride is rapidly becoming a material universally used by all state highway departments, as well as by numerous counties and cities in curing their concrete roads. Curing by calcium chloride does away with the necessity of covering the freshly poured concrete with earth and sprinkling it daily with water. This method is much simpler and appeals immediately to the contractor. For this treatment, granulated or flaked calcium chloride is used. The material is spread evenly over the new concrete at the rate of approximately 3 pounds per square yard. The application should be made between 8 and 16 hours after the pouring. Tests which are now being carried on by the Semet-Solvay Company, Syracuse, N. Y., show that probably a smaller amount than 3 pounds per square yard can be used and give equally good results.

Granulated calcium chloride spreads quite as easily as sand does. One or two men in a

very short time can cover all the concrete which has been poured in a day, on the following morning. To cover the same space with earth requires an entire road force working two or three hours. Calcium chloride applied to the road in this manner cures the concrete in 24 hours. If it should rain, the treated portion of the road should be covered to protect the calcium chloride, or if washed off, it should be re-treated. After 24 hours no harm is done if rain washes away the chemical. When this material is used for curing purposes, it also has an accelerating effect on the concrete; in other words, the road becomes much harder in a very much shorter time. The road can be opened to traffic in less than half the time which it takes for curing by the old method of covering with earth and daily sprinkling.

Field tests which were conducted during the last year by the Illinois State Division of Highways have brought out these facts admirably.



A PORTION OF ROUTE 5, ILLINOIS STATE HIGHWAY, BUILT BY McCALL CONSTRUCTION COMPANY, USING CALCIUM CHLORIDE FOR CURING

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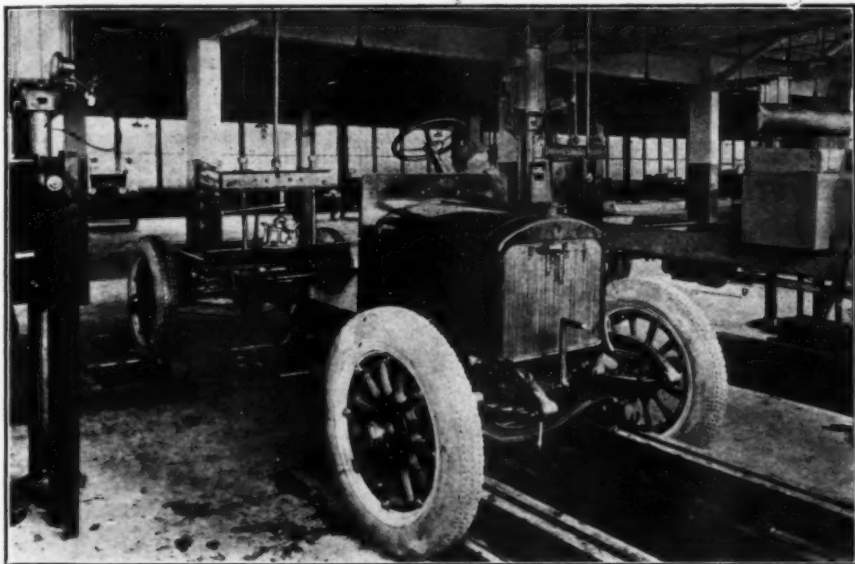
## A Test House for Motor Trucks

**P**ROBABLY the largest and most complete test house of any automobile or truck manufacturer in this country has recently been completed by the General Motors Truck Company, Pontiac, Mich. Trucks will be tested in the factory for gasoline consumption, ignition, carburetor adjustment, oil distribution, water circulation, speed, horse-power developed at the rear wheels, and friction in all sections of the chassis.

Sufficient blocks have been installed to give the factory a testing capacity of 100 trucks

into the factory, where it is converted into use as power.

At the left of the truck on the dynamometer are the test instruments and a control board. A visible gasoline tank is also connected with the truck and the pipe run directly to the carburetor line. The glass tank is marked off in half-gallon units so that an accurate check of the consumption can be kept. This tank is filled automatically from above by simply pulling a chain, which is connected with a pipe to a main tank, supplying all blocks.



A TRUCK ON THE BLOCK UNDERGOING A TEST

daily. Every instrument known to modern automobile engineering science for the testing of automobiles has been installed. When the trucks come off the assembly chain and are passed by the inspectors, they are run to the test house only a few feet away from the end of the chain, and onto one of the blocks. The front wheels are held in place by automatic jacks, which catch as the rear wheels are driven up onto two rollers, and the jacks in front are so placed that they can accommodate any wheel-base desired.

The rear wheels of the trucks rest on the two rollers, which are connected and driven for the traction test by a 50-horse-power electric motor in a gallery just below the floor. The motors, in addition to driving the wheels of the truck on the dynamometer test block, are dynamos, and when the motor truck is run they generate electricity, which in turn is sent through electrical apparatus and carried back

into the factory, where it is converted into use as power. In front of the truck is a swinging hose, suspended from the ceiling so that water can be replenished in the radiator at will. A check is also kept on oil consumption in the same manner in which the gasoline is watched.

A metal hose is attached to the exhaust pipe of each truck, and this is run down through the floor and exhausted into the air through separate ducts. Also, in order to avoid engine gassing, a ventilator is installed over each block. Above the control board at the left of the truck is a speedometer showing the miles per hour a truck is being driven and the miles it has been run, and this is used in connection with the checking up of gasoline and oil mileage. This speedometer is driven by a flexible shaft leading to the main drive shaft of the rolls. Just above the controls is an automatic chart which shows the relation of friction to speed, whether it be in high or low range of the transmission or in reverse. It also shows the friction in the motor,



which can be run in direct drive at high gear without firing and driven by the dynamometer motor through the rear wheels. Again, this chart shows the power developed by the motor as it is tested out, firing, in all three speeds, and reverse, and an automatic red-ink pen, controlled by a clock arrangement, marks the fluctuations of the power on ruled paper. Below this chart are the controls which slow or speed up the dynamometer at will, and safety devices for protection.

Suspended from the ceiling at the rear of the

truck and directly over the cross-member in the frame is a Loadometer, made by the Black & Decker Manufacturing Company, Towson Heights, Baltimore, Md., by means of which any required load is applied. By turning a handle it is possible to apply a load of from one to ten or more tons directly over the rear wheels.

The rollers on which the rear wheels rest are so constructed that, according to the factory engineers, a road condition is maintained—with the exception of the bumps.

## An Instructive and Entertaining Building Film

**I**N various parts of the country, particularly in Ohio and California, model homes have been constructed with the idea of stimulating an interest in home building. These model homes have created a great deal of interest locally, but have done little nationally. The demand for some method of giving national scope to this movement finally resulted in commissioning the Atlas Educational Film Company, Oak Park, Ill., to produce a five-reel feature film, showing the erection, equipping and furnishing of a modern six-room brick Colonial home.

This film will be shown all over the country under the auspices, and with the cooperation, of real estate boards, commercial, advertising, Rotary, Kiwanis, Lions and other clubs and organizations, and also through official government non-theatrical distribution bureaus and through churches and community centers.

An attractive building lot in Glen Ellyn, Ill., has been chosen for the purpose of this film. A

modern six-room brick Colonial home will be erected on the site. This will eventually be equipped with every modern convenience, electrical and otherwise. Everything is being done to make it as nearly perfect as possible. The scenario is founded on the familiar facts of human life, things that are happening around us constantly. Converted into motion pictures with real actors, it will form an interesting story. An element of romance throughout the film carries the proposition out of the ordinary and places it in the realm of interesting stories. A number of factors, such as the investment problem, selection of the lot, the contractor, the architect, choice of materials and furnishing the home are prominently featured.

The proposition is being financed to a large degree by the various manufacturers whose products are used in the construction of the model home. The film may be obtained through the Atlas Educational Film Company, Oak Park, Ill.

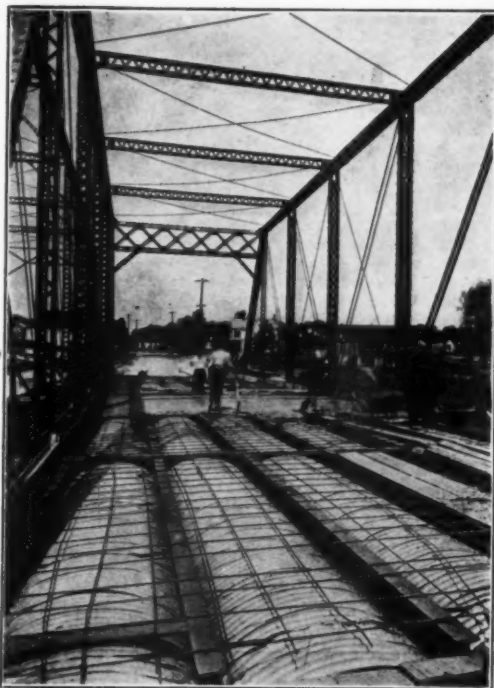


LAYING THE FOUNDATION AND WALLS OF THE PERFECT HOUSE  
A "still" taken from the "Own Your Own Home" Campaign motion picture

## Corrugated Arches for Bridge Flooring

THE use of corrugated arches for flooring modern I-beam highway bridges is a considerable advance in practical efficiency. The dead load of this type of construction is much less than that of most other forms of bridge flooring in that a far larger portion of the material employed in the actual construction of the bridge itself is devoted to carrying the weight of traffic rather than to supporting the dead load. The consequence is that the same degree of strength may be attained with a considerably smaller expenditure.

With I-beams of proper size, 10-gage or 12-gage corrugated Armo arches, made by the American Rolling Mill Company, Middletown, Ohio, with the space between the lower portion of the segment and the beam filled with grout and the whole covered with a reasonable depth of well-compacted road material and a water-proof surface, would constitute an economical, reliable and long-lived bridge. Each corrugation is practically an I-beam in itself, hence this construction in the form of an arch results in a maximum of strength from the material employed. There are no forms to remove, as the arches remain an integral part of the structure. In some cases the corrugated iron is entirely covered with concrete. This makes possible the use of lighter gage, but increases the dead load and therefore the necessary weight of the I-beams.



ARCHES AND REINFORCING READY FOR POURING CONCRETE

## City and Town Walks Should Be Inconspicuous

They Are Strictly Utilitarian and Not Meant to Be Striking

WHEN a person enters one of the typical old New England towns, he finds it difficult to disassociate from the whole all the elements which contribute to the general attractive effect. There are certain of them, however, concerning which there is no doubt; for example, the trees that line the streets, the dignity of the Colonial architecture, and the old walks.

J. F. Whitney, Assistant Extension Professor of Landscape Gardening, Massachusetts Agricultural College, in writing in a recent issue of *The Hampden*, stated that during the past year he noted the first conspicuous "improvement" in one of these towns. The old so-called "tar" walks, which were patched here and there and cracked with age, had been removed and concrete walks laid in their places—walks that shine with newness—and immediately put upon the town the stamp of progressiveness. Looking

across the street, which is gray in color, he saw the bright white streak of the new walk and actually was less conscious of the century-old sugar maples that bordered it. The walk did not seem to harmonize with the village. It was too conspicuously and rawly new.

Walks are made to walk on and not to look at, for in themselves they are not beautiful. One would never isolate a walk from its surroundings and hold it up for admiration as he would a Greek vase. If it is the surroundings that make its appearance attractive, then the walk should be of a color subdued enough not to detract from the important elements of the picture. A concrete walk should be toned down slightly with lampblack or a color, so as not to divert the attention. In Forest Hills Gardens, N. Y., walks have been given a bricky color with successful results as to permanence of color and harmony.

## The Construction of Building Foundations

IT is obvious that no satisfactory buildings can be erected on poor foundations. Many an otherwise handsome structure is rendered unsightly by cracked walls, due directly to settlement, in turn due to poorly designed or constructed foundations. Simple though it may be at first glance, the design of foundations is a highly complicated operation, requiring a high degree of technical proficiency and engineering judgment. Complications are introduced by the varying supporting power of different soils; the ratio of dead to live load—whether applied momentarily or for long periods, whether quiet or moving, whether or not involving vibration or impact; and, by no means least, the uncertainty usually existing as to the actual amount of live load and as to the portions of the structure in which it will occur.

On foundations varying from rock to hard soil, a non-uniformly distributed load may safely be placed. The finer sands and wet soils reaching down to plastic bottoms demand a uniform distribution of pressure so as not to exceed the safe bearing value of the soil in question, and foundations must be designed to secure this, tension developed in the wall being taken care of by proper reinforcement. The following table of permissible soil pressure is found in Passwell's "Retaining Walls":

PERMISSIBLE SOIL PRESSURES IN TONS PER SQUARE FOOT

Soil	A	B	C	D	E
Quicksand, silt .....	1	1	..	..	..
Clay, soft .....	2	2	1	1	1
Clay and sand .....	2	4	2	2	T
Sand, clean, dry .....	2	4	3	3	..
Sand compacted, well cemented .....	4	6	..	..	..
Gravel and coarse sand, 6-8	..	6	6	4	6
Gravel and coarse sand well compacted .....	8	10	10	..	..
Clay, hard, moderately dry .....	4	6	..	..	..
Clay, hard, dry .....	6	8	4	4	4
Rock, soft to hard .....	5-200	*75	8-40	..	12-20

A—Prof. Cain.

B—Public Service Commission, First District, New York City.

C—Building Code, New York City.

D—Building Code, Dist. of Washington.

E—Building Code, Baltimore.

\*—Sound ledge rock.

T—Clay or clay mixed with sand, firm and dry, 3 tons.

Two advantages of expanded metal reinforcing, such as the Econo expanded metal reinforcing made by the Northwestern Expanded Metal Company, 407 South Dearborn Street, Chicago, Ill., for foundation work, is its certainty of correct distribution and its ability to distribute stress as well as to tie a mass of concrete together. These are of especial value in foundations because of the impossibility of examining them after completion. They must be right, and there must be no uncertainty about it at any time.

### Continuous Wall Footings

For buildings of moderate height and load-

ing, it is common to carry bearing walls on a continuous footing, sometimes known as a cantilever footing. Expanded metal is of great value in such cases. The footing must be wide enough so that pounds per lineal foot of wall divided by the transverse width of the footing does not exceed the safe bearing power of the soil.

By the use of reinforcement, the footing may be extended to obtain a satisfactory width. In an unreinforced footing this can be done only with large masses of masonry, which, in addition to the direct cost, have the disadvantage of either requiring excessive depths of excavation with consequent expense and often physical difficulty from inflowing water, etc., or of encroaching on the space inside the building.

Expanded metal reinforcement is remarkably adapted to such construction; not only does it take care of the computed stresses, but it also provides for indeterminate stresses parallel to the wall arising from inequalities in the supporting power of the soil, from shrinkage and similar causes. The possibility of placing it accurately and securely in large areas at one operation without elaborate tying and spacing is productive of speed—often a matter of great importance with difficult work.

A continuous wall footing is designed as a uniformly loaded cantilever, the length being taken as the portion outside of the wall itself. The load is, of course, the computed unit pressure on the soil. Shear at the edges of the wall should be investigated.

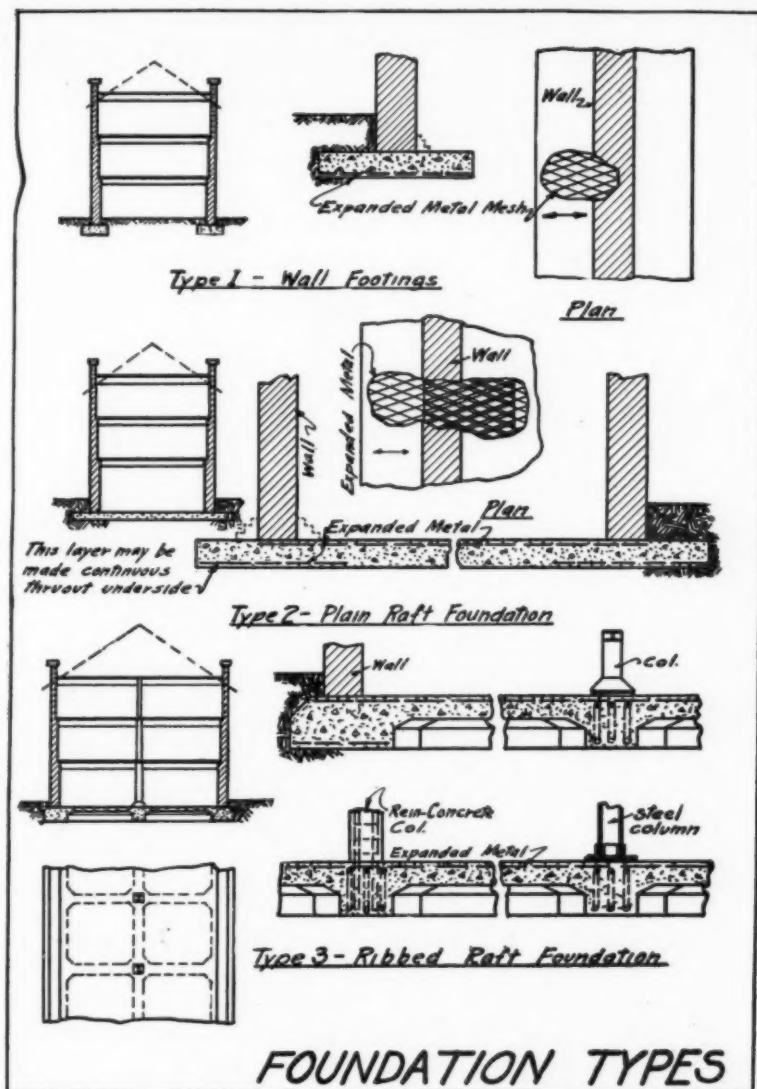
### Raft Foundations

With soils of low bearing power, it is frequently necessary or desirable to distribute the weight of the building over the entire area occupied by it. This is accomplished by putting in the entire basement floor as a monolithic slab of concrete, properly reinforced. The details are too variable and complicated to be considered here. Only general remarks can be made.

In most cases, the upward pressure from the soil will be uniform over the entire foundation. Concentrated downward pressure will occur under bearing walls, columns, piers, heavy machinery, etc. The local shears and bending moments resulting must receive detailed attention.

For the lighter type of buildings, the raft will be generally from 6 inches to 9 inches thick, reinforced as described below. For heavier buildings, such as power-houses, rafts 2 feet 6 inches in thickness have been successfully used, reinforced with two continuous layers of heavy expanded metal mesh, one layer throughout near the underside, and the other throughout near the top side of the concrete.

The foundation slabs will usually extend somewhat beyond the exterior walls. As a re-



sult, there will be cantilever action in the slab, requiring reinforcement at the bottom, outside the wall. At the wall the moment will reverse, requiring reinforcement in the top of the slab. The concentrated load of interior wall will cause another reversal of moment, requiring the reinforcement to be at the bottom of the slab under the wall.

The points at which negative moments change to positive and at which, consequently, reinforcement should change from the top to

the bottom of the slab can be determined only by computation in each individual case. As a matter of fact, some of the factors are so uncertain that the top and bottom reinforcements should overlap for some distance either side of the point where, according to computations, the moment changes.

#### Ribbed Foundations

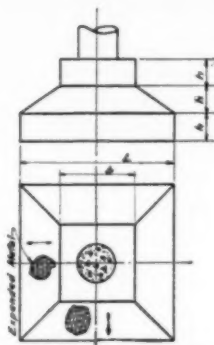
A modification of the raft foundation is the ribbed foundation. To the plain monolithic

slab of the rafts are added reinforced ribs or girders. In this way, a concentrated column or wall load may be distributed over a large area of raft. This permits a concentrated load not possible with the plain raft and, even in the absence of such concentrated load, may make it possible to use a thinner slab with resulting economy.

The designing problem is practically that of the uniformly loaded floor inverted, the concentrated loads taking the place of supporting walls or columns. In the slab itself, expanded metal reinforcement should be employed for the same reasons as in the plain raft. In the ribs, the concentration of reinforcement in a small space requires steel area beyond the range of expanded metal, and rods must be resorted to. In all types, the detail of lapping the expanded metal at joints, both end and side laps, requires special thought with the object of obtaining continuity of reinforcement and providing for horizontal shears.

#### Single Piers

If an individual column is to be carried on its own individual foundation, the first step is to determine the dimensions necessary in order that the allowable unit pressure on the soil shall not be exceeded. The dimensions of the footing must then, in some way, be tapered down to the dimensions of the column itself. Before the day of reinforced concrete, this was done by means of battered or stepped masonry. Good practise required that the battering or stepping should not exceed certainly a ratio of more than about one horizontal to one vertical, and a ratio of two horizontal to three vertical was more customary. This was necessary in order that the masonry might not be cracked by tension stresses. The depth of



PLAN FOR SINGLE PIER

excavation required was excessive unless the footing could be allowed to encroach on basement space. Reinforced concrete removed these limitations, permitting stepped footings to be built in which the horizontal projection of one step beyond the next step above may be considerably more than the depth of the step.

The vertical and horizontal dimensions of the step are determined by considerations of punching shear and diagonal tension after determining the dimensions of the bottom step by allowable unit soil pressure. The projecting portion of each step should be figured as a uniformly loaded cantilever, and reinforced accordingly. A reinforcement so computed should, however, extend the full width of the footing, as otherwise the tension in the reinforcement would not be properly bonded into the concrete.

## As a Building Contractor, Are You Over-looking a Chance to Make Money?

**B**UILDING contractors seem to have overlooked the wonderful possibilities that lie in a close cultivation of prospects for fall and winter repair and alteration work, generally. This point was brought out forcibly by *The Improvement Bulletin* in an item mentioning a builder who, in talking over general business conditions, said, "Well, I guess building is about on its last legs for this year." Such an impression—and it is quite general—shows that it is high time that business possibilities of fall repair work were realized to a greater extent than now seems to be the case. Why should it be necessary to assume that because the end of the summer building season is at hand, the contractor must hiber-

nate like a bear for the next few months?

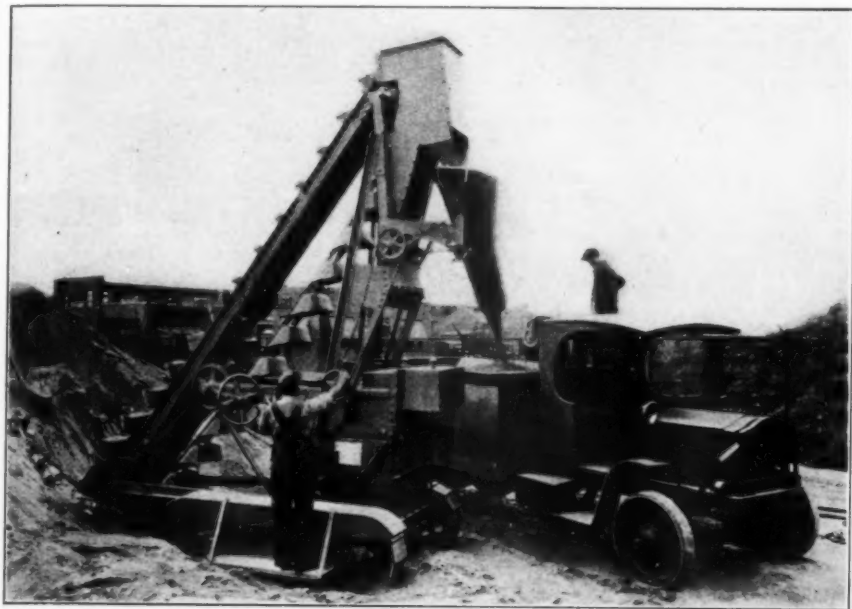
It is true that less new construction will be started in the months immediately ahead of us, but that is no reason why the contractor or the dealer in building supplies should throw up his hands and quit. The idea that building in the Northwest is a six months' proposition is exploded. The fall and winter months offer wonderful possibilities for getting in a lot of extra business, and so should be given some mighty close thought to see how those possibilities may be developed. City or country, it makes no difference, there are hundreds of gilt-edged prospects for your services in your immediate vicinity if you will only go out and seek them.



## A Modern Development in Portable Loaders

WHEN one realizes the almost absolute necessity of portable loaders for the economical handling, from ground to storage, of such materials as sand, gravel, crushed stone, coal, coke, cinders, slag and other loose materials, it seems strange that the development of this type of equipment has been accomplished almost entirely during the last decade. Not until 1910 had the demand for

had to be shoveled to the bucket. These machines required almost ideal conditions to travel at all, and hence could not readily be fed into the pile. The self-propelling device was the first important new feature embodied in the loader, and enabled the machine to be moved about with greater ease. As first designed, the self-propelling feature had but one speed in each direction; afterwards, two speeds



THE RESULT OF CONTINUOUS STUDY AND EXPERIMENT—A TANKRED LOADER FOR TRUCKS

mechanical equipment to eliminate hard labor in handling loose materials become strong enough to warrant the development of a portable loading device. In that year the Jeffrey Manufacturing Company, Columbus, Ohio, developed its first bucket loader. While an elevator on wheels was about all the original loaders represented, many of these first machines are still in use and are giving satisfactory service.

Up to the year 1914, portable loaders were built by mounting standard bucket elevators on portable structural steel frames and were moved from place to place by being hitched on behind a wagon. Supporting wheels were woefully small and guiding and controlling mechanisms very crude. Take-up boxes at the foot of the elevators interfered so much with the action of the buckets that they would pick up only a limited amount, even of loose material, and all hard or semi-packed material

were provided, one to move the machine from place to place, and the other a slower speed for feeding into the pile.

To illustrate the rapid development of the loaders, it is interesting to note the features of the latest type of Jeffrey portable bucket loaders, known as the Tankred. For the mounting of present-day loaders, a three-point suspension is almost universally used, keeping the machine more stable on rough, soft ground. The latest and most satisfactory arrangement is the substitution of a crawler or caterpillar mounting similar to that used on war tanks, but of lighter construction and with a three-point support to the frame. The buckets used on the loaders are of very heavy malleable iron and are provided with steel cutting edges extending well around the ends of the buckets; these edges protect the buckets from wear and are themselves renewable. The whole bucket is so designed that the

digging edge has a cutting clearance at all points.

The whole foot of the elevator is so constructed that the buckets are wider than any other part, so that the whole machine can be advanced several feet into the pile with nothing but the clean cutting edge of the bucket coming in contact with the material; consequently, the machine will handle reasonably hard or frozen material, even if it will not flow. Another distinctive feature of the loader is a relatively large foot-wheel which, by reducing the centrifugal force, enables the buckets to pick up the materials, and especially the large lumps, without kicking them away. A flexible wood boom keeps the bucket digging but will spring enough to release the buckets from overload strains when they encounter a cave-in or an obstruction, such as a railroad tie. Two speeds, a traveling speed for moving the machine from place to place, and a feeding speed for driving the machine directly into the pile, give a wide flexibility of operation.

The net result of these various features of design and construction is that the operator, who is the only man required in connection with the use of the loader, can readily so manage his machine that the buckets are practically always full. The increase of the size of automobile trucks has made it imperative to raise the discharge point of the loading machine. Seven feet was the ordinary clearance in 1914, whereas 9 feet or 9 feet 6 inches is now the standard. A universal swivel spout

applied to the Jeffrey loader enables the operator to spot the material in various portions of the truck with very little change of position of either the truck or the loader, thus saving a great deal of time and manual labor in spreading the load. The truck may be driven in front of the loader equipped with this device, and every position of the bed may be filled without moving the truck, even if the loader, in the meantime, has to change its position. A gathering device similar to a road scraper can be attached to the machine, making it possible to gather and load materials spread out in a thin layer or windrow on a road-bed. In order to increase the capacity of the loading machines by keeping the elevator at work while a full truck is being pulled away and an empty one driven into place, storage hoppers have been developed, so arranged as to catch the discharge from the buckets. These hoppers are provided with a quick-opening valve, by means of which the contents of the hopper can be properly discharged into the truck. The hoppers are sometimes made with adjustable sides, so as to correctly measure materials for a batch for concrete mixing machines.

The machine is equipped with either gas or electric power. The increasing headroom and provision for various attachments which have been developed for these loaders have made it necessary to provide a much taller and heavier machine. To keep this from being top-heavy, a wider and larger wheel-base, with correspondingly larger axles, is used.

## Fireproofing Viaduct over Railroad Yards with Cement Gun

**A** RATHER novel piece of work was performed recently by Ryberg Brothers, members of the A. G. C., in connection with the fireproofing of a viaduct over the Denver and Rio Grande western freight yards in Salt Lake City.

A few months ago, sparks from a locomotive set fire to the under-side of the wood flooring on this viaduct, and, owing to the extreme difficulty of fighting the fire from underneath with trains moving back and forth and standing on the tracks under the viaduct, damage approxi-

mating \$100,000 was sustained before the fire was extinguished.

The railroad officials decided to fireproof the exposed wood portions of the repaired structure. The contractors mounted their equipment on a string of flat cars, the gas compressor on one car, the cement gun on another, and so on. All wood surfaces are being covered from below with gunite in this manner, and the string of cars is switched from track to track underneath the viaduct as the work progresses.

—The Constructor.

## Better Highways to Relieve City Congestion

**T**HE highway engineer is needed sorely at this moment, the engineer with daring imagination, to help scatter the dwelling houses and residence facilities of cities of more than 25,000 population far and wide into the outlying open country, and thus in some appreciable way to relieve congestion in American cities.

A large factor in decentralizing city homes is the transportation problem, which challenges the genius of highway engineers. Less than one-third the entire population of the United States is on farms. Sixty-eight cities of more than 100,000 population each contain nearly another third. The thirty-odd millions of people living in cities of 25,000 population and over are being

brought into immediate contact with the commodities of living, the skills of service, and the institutional wisdom of the world, whereas those who live on farms receive few of these advantages.

A system of complete terminal towns connected by rail or water with wholesaling cities, and by an adequate highway system to groups of farm population, is the solution for taking the curse off farming and "opening the door to a good kind of life on the farm."

—Dr. C. J. Galpin, U. S. Department of Agriculture, at Second Annual Conference on Highway Transportation Education.



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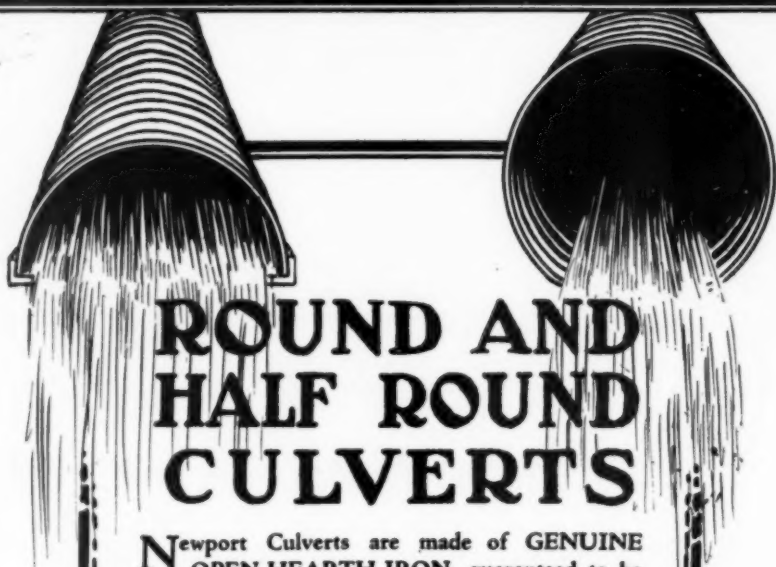
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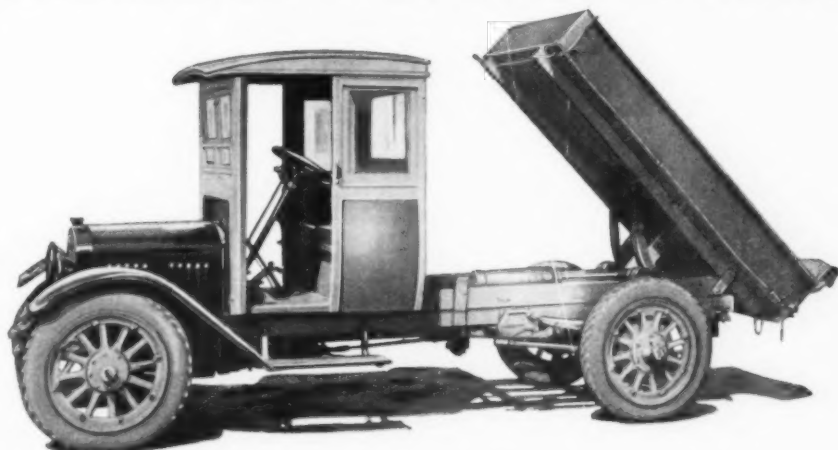
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